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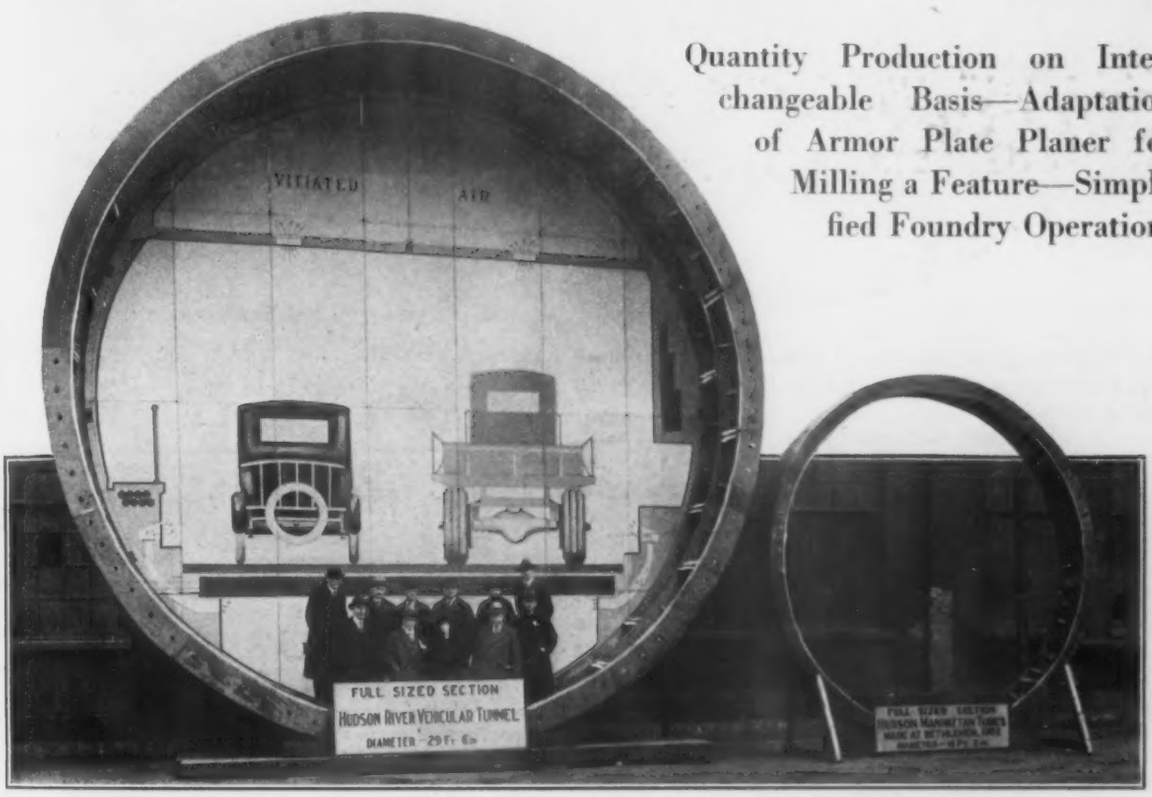
ESTABLISHED 1855 VOL. 111, No. 10

Making Castings for Hudson River Tunnel

Quantity Production on Interchangeable Basis—Adaptation of Armor Plate Planer for Milling a Feature—Simplified Foundry Operations



The Size of the Hudson River Vehicular Tunnel May Be Apprehended from a Comparison with the Tube Linings Made at Bethlehem in 1902 for the Hudson & Manhattan Tubes Under the Hudson River. A fresh air duct is provided under the roadway and the upper space of each tube will be used for exhausting the air

WHEN the construction of the Hudson River vehicular tunnel connecting New Jersey and New York States at New York City was first under discussion, there was considerable wondering on the part of some prospective bidders for the contract to make the metal lining, as to where they should find all the large or special tools to machine the segments of which the lining was to be built. It was anticipated that this would require such special machines because of the peculiar nature of the work, or rather the unusual shape of the segments and the size of the contract.

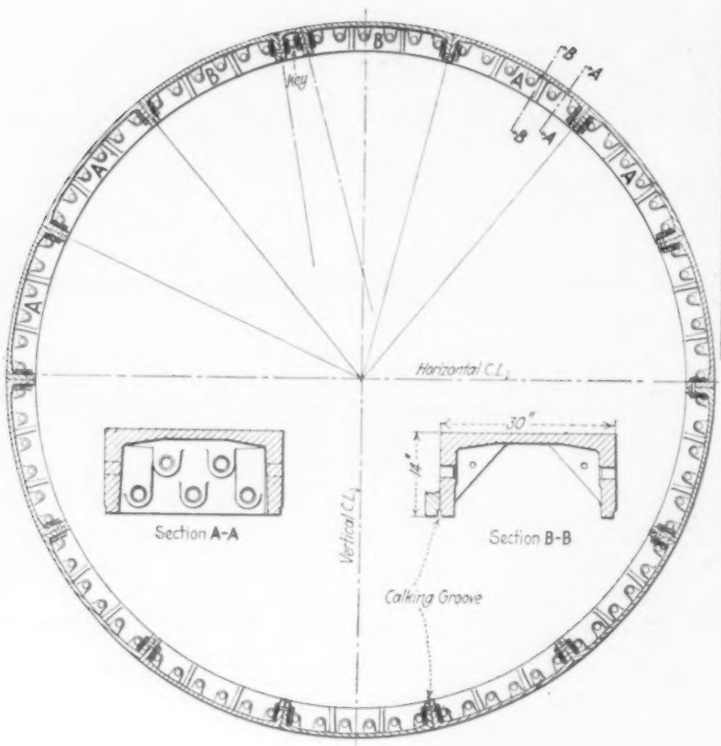
Due to the ingenuity of its production department the Bethlehem Steel Co., which was the successful bidder, has worked out a comparatively simple method of machining these segments at Bethlehem, Pa, on the so-called quantity production basis. Naturally no matter how simple the actual machining may be, the handling of such a contract requires much supplementary equipment and space, as well as special training for the personnel.

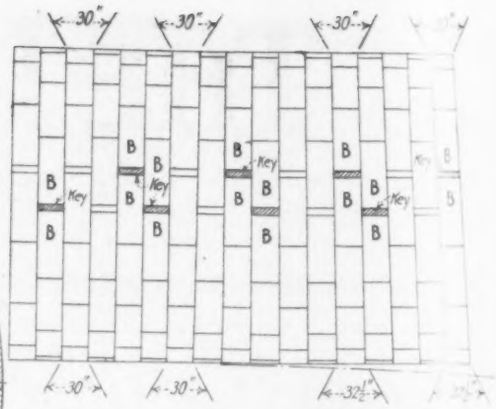
That the reader may have a clear conception of the size of this task, a short description of the tunnel construction will probably be of interest.

There will be two similar tubes, one for westbound and one for eastbound traffic. In a part of each of these tubes is a section lined with metal. The length of this lining is 6756 ft., or about 2½ miles for both tubes. Each tube is 29 ft. 6 in. diameter for the greater part of its length with a short section 30 ft. 4 in. for better ventilation on the steepest grade.

This metal lining is composed chiefly of gray iron though some parts of it are of cast steel. The segmental rings have a length of 30 in. along the axis of the tunnel and each ring is made up of 15 separate segments. There are approximately 5400 rings in the tunnel, making a total of about 81,000 castings. Of this number 75,600 will weigh about 1½ tons each, while the remaining 5400 will weigh about 800 lb. each. This will make a total weight of over 115,000 tons.

The larger number of the rings have parallel faces, or are straight rings used for straight sections of the tunnel. When a change in line or grade is made in the tunnel, rings with faces at a slight angle to each other are used and are known as taper rings. These are made in two sizes in longitudinal dimensions, namely, 1¼ in. and 2½ in. longer on one side over the nominal length of 30 in. An





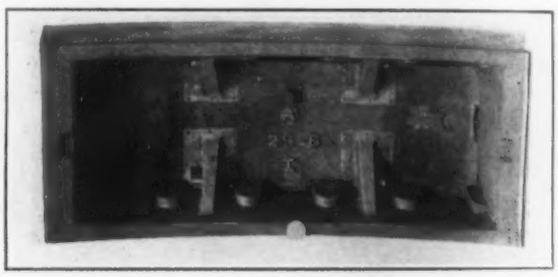
Where a Change Occurs in the Grade or Where a Curve Is Required, Tapered Rings Are Employed

Three Classes of Segments Compose the Ring. There are 12 *A* segments having both ends radial, 2 *B* segments with only one end radial and 1 special segment, which is inserted between the 2 *B* segments

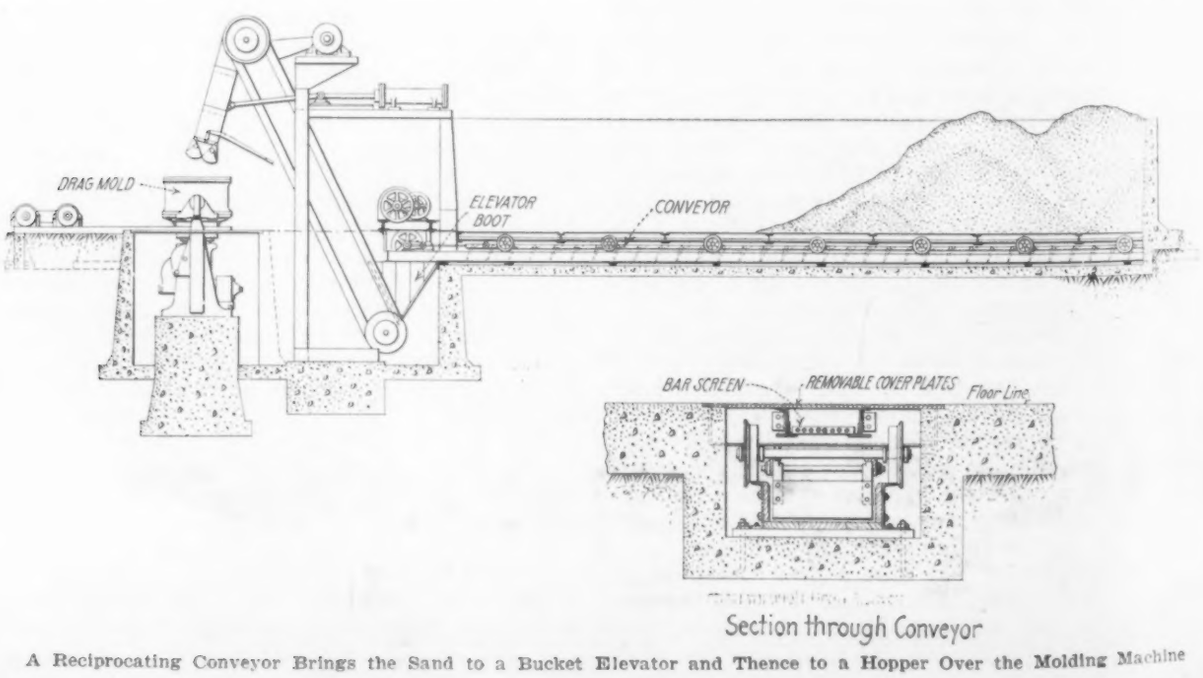
accompanying sketch shows how the use of these segments permits the lining to follow a curve in the tunnel.

In the tunnel excavation the segments of each ring are put in position and bolted together, and the rings likewise bolted together, the joints being staggered. It is evident that some method of closing each ring from the inside must be provided. To accomplish this, one segment is made small, as previously noted in weights, and this key segment is made with non-radial joints. The ends of the two segments adjoining the key segment, known as *B* segments, have non-radial joints, these forming an opening to permit insertion of the key from the inside of the ring. The other 12 segments of the ring are called *A* segments, and have radial joints and are duplicates of one another. One of the drawings shows how the segments are assembled to make a ring.

Considering the use of three different segments in each straight ring, and a complete set of patterns for each segment in each of the two sizes of taper rings, the importance of the pattern equipment as a link in quantity production is readily understood. For the 29 ft. 6 in. section there are required 57 segment and 7 key patterns, with ap-



A Typical Pattern Indicating the Core Work Required and the Marking of the Type and Location of Casting



A Reciprocating Conveyor Brings the Sand to a Bucket Elevator and Thence to a Hopper Over the Molding Machine

An Armor Plate Planer Has Been Converted by the Application of Two Individually Motor Driven Milling Heads Set at Proper Angles to Machine the Ends of the Segments in One Pass

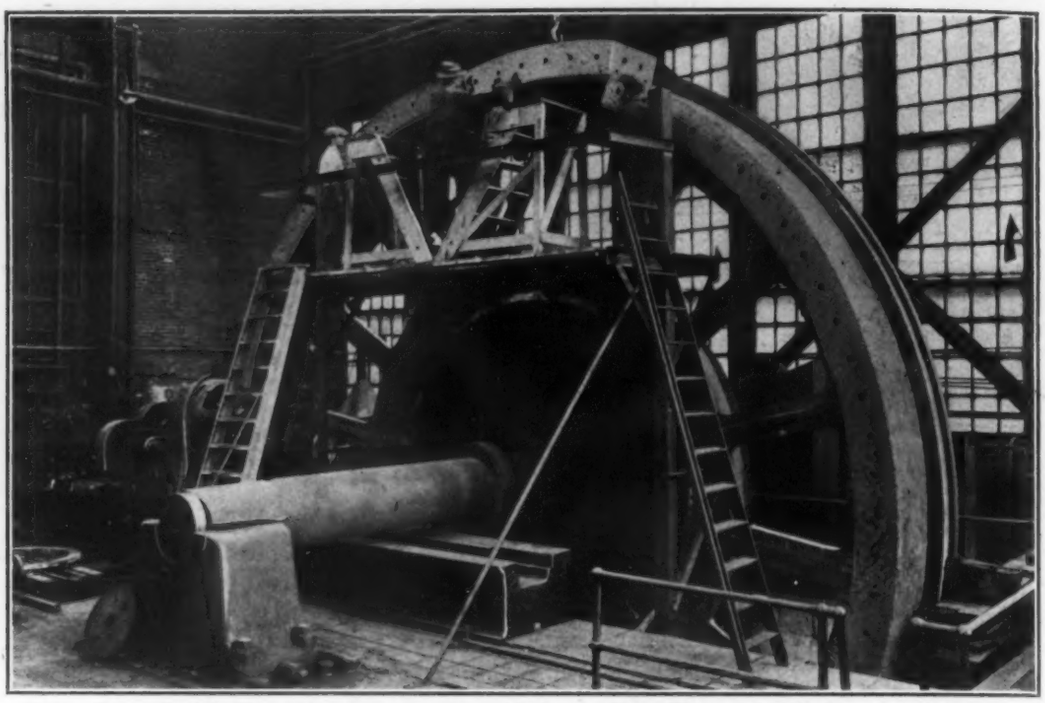
proximately the same number for the 30 ft. 4 in. section. A reproduced photograph of a pattern for an A segment, straight section, gives a general idea of the patterns used. The patterns for the cast steel segments are slightly larger to allow for greater shrinkage in casting, and more finish is allowed for machining. The numbering and lettering necessary to facilitate manufacture, inspection and erection of the segments is indicated in the photograph. This includes the segment number, diameter of tunnel, heat number, trade mark and, in the case of taper segments, the size of the taper and erection numbers.

Molding sand from a large sand bin is fed by a drag conveyor to a bucket elevator, which carries it to an overhead reservoir above the molding table. A gate regulates the flow from this reservoir, so that flasks are rapidly filled. A sectional drawing of this is shown. Jolting by compressed air quickly packs the sand to the proper density. The flask is then lifted and rotated through 180 deg.; a receiving car is run beneath, and the flask deposited upon it. The pattern is then drawn, the drag part of the mold is transferred to the finishing floor by means of a crane, and the operation is ready to be repeated. The cope, or upper portion of the flask, is similarly molded on a plain jolt machine, and then transferred by crane to the pouring floor and placed directly on the finished drags.

The making and placing of cores is an important part of finishing the mold. Each segment mold requires two end cores, 12 side cores, four brace cores and one grouting hole core, or a total of 19. These cores must be accurately made and placed, as the segments are designed to be interchangeable.

Hot metal from two 84-in. cupolas is taken for pouring the tunnel segments. Each ladle of hot metal will pour three segments. As every ladle is poured, a so-called arbitration test bar, 1¼ in. in

The Flask Is Carried on a Special Car from Which It Is Carried by Crane to the Pouring Floor



Those Rings Which Have to Taper Are Assembled on a Face Plate and Milled on One Side. The loading is done continuously as the finished segments reach the top position

diameter and 15 in. long, is cast vertically. These are later analyzed for phosphorus and sulphur content and are also tested for transverse strength and amount of deflection.

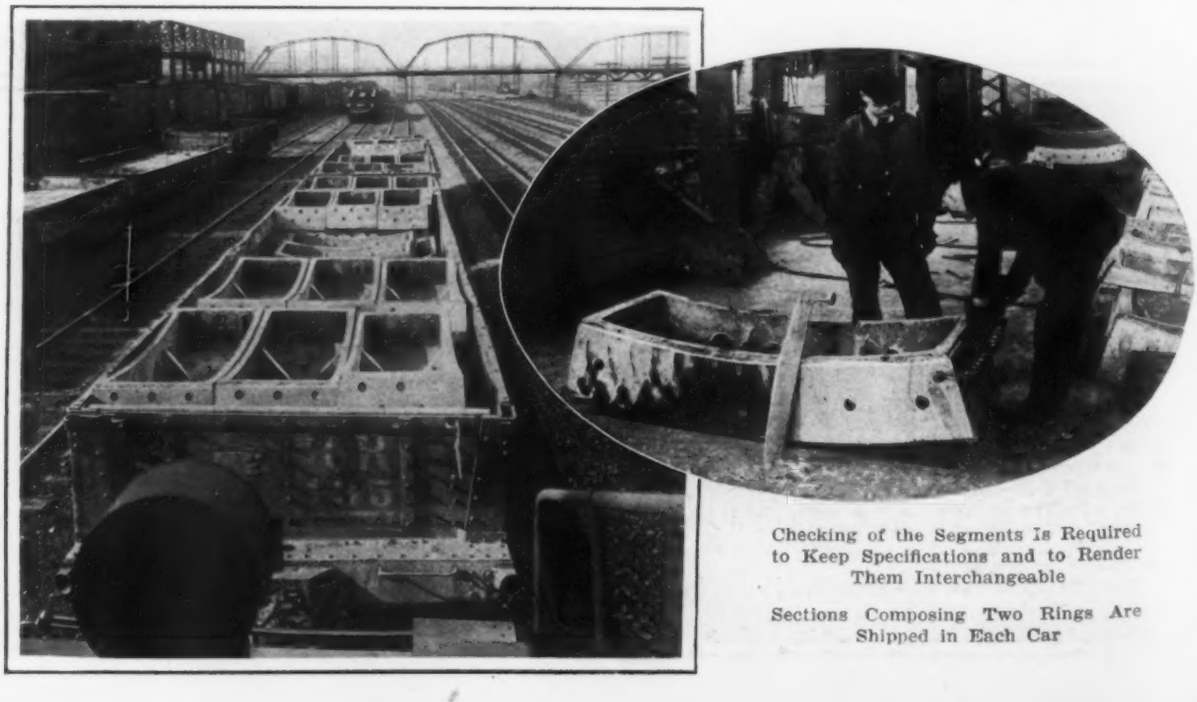
It will readily be seen that in the interests of economy the handling and transporting of over 80,000 of these heavy castings should be reduced to a minimum. For this reason machines for finishing the ends and sides of the segments were installed in adjacent bays in the foundry itself, there being sufficient room in the foundry building to allow this without interfering with the foundry operations.

After cleaning and chipping, the segments are segregated as *A* segments or those with radial ends, *B* or those having one end non-radial, key segments, and 1¼ in. taper and 2½ in. taper segments.

A milling machine was designed and built in the Bethlehem shops for milling two sides of the *A* and *B* segments simultaneously. The segments are loaded two high in fixtures on this machine, located in position by special round headed bolts and held in place by four clamping crabs. Two traveling heads, each equipped with 48-in. cutter heads, with inserted roughing and finishing tools, complete the sides to size in one cut, to a tolerance of plus nothing and minus 0.015 in. in a normal width of 30 in.

As the traveling heads move from one end to the other, the fixtures with machined segments are removed and replaced with loaded spare fixtures. After the heads have completed their travel, the cutter heads are separated to provide clearance on their return while passing the rough castings that have taken the place of the machined castings. At the end of the return travel of the heads, the cutter heads are run in to a fixed stop and the cycle is repeated.

On tapered segments, only one side is machined here, the other being machined later in a special machine after the segments are bolted in a ring.



Checking of the Segments Is Required to Keep Specifications and to Render Them Interchangeable

Sections Composing Two Rings Are Shipped in Each Car

From the side milling machine the segments are transferred by a revolving table to the adjacent bay where the ends are machined.

In machining the ends, the segments are first loaded one high in fixtures on a stationary bed. A traveling head, carrying two cutter heads, completes the machining of the two ends in one operation, and the cycle of operations is performed similarly to the side machining described. The cutter heads are adjustable and are set at the correct angle to give radial end joints to the *A* segments. When machining *B* segments one cutter head is changed to machine the non-radial end to the correct angle.

Segments for the taper rings used on curves and changes of grade have their ends and one side machined as described above. To machine the second side, it was necessary to design a special lathe to take care of taper segments.

The segments are clamped to the spider in their proper order and travel past the cutter head and are machined to size. As the ring of segments revolves, the finished segments come to the top, and they are unbolted and lifted out, and unfinished segments put in their place and bolted. The milling operation is continuous when machining a particular taper.

A careful inspection of all segments is necessary. The width is gaged at each end and at the center, to a tolerance of 30 in. plus nothing and minus 0.015 in. The side holes and angles of ends are checked by template. The 16 inside bosses for washer seats are tested for parallelism with a plug and collar gage. The brackets are gaged for location and distance, and the bracket holes are gaged with a pin gage.

The segments are then examined for fit of grout plug, size of calking strip, and tarring, and if approved are passed and stamped by commission inspectors. The finished surfaces are then covered with a coat of white lead and tallow.

Shipments are made in rings, although all straight segments must be interchangeable. The taper rings are numbered and it is the intention of the contractors to erect them in rings with the segments of the same numbers as they were machined. Two complete rings, of a total weight of approximately 42 tons, are loaded in each car.

Freight Car Steel Castings Advance

PITTSBURGH, Mar. 5.—A leading maker of freight car steel castings here has announced an advance in prices of 10 per cent. The new price list is given in the following table:

Name of Casting and Division of Weight	When ordered in quantities as shown below from one pattern at one time: 1	2	3-5	6-9	10-24	25-49	50-99	100-249	250-499	500-Over
Bolster Center Fillers (See Note 1):										
Over 25— 50 lb.	18.15c.	16.55c.	15.05c.	13.75c.	12.50c.	11.40c.	10.80c.	10.30c.	9.75c.	9.25c.
Over 50—100 lb.	13.85	12.75	11.75	10.85	9.95	9.15	8.85	8.30	7.95	7.60
Over 100 lb.	12.10	11.25	10.45	9.75	9.05	8.40	8.15	7.80	7.50	7.15
Center Plates:										
Over 25— 50 lb.	15.35	14.00	12.75	11.60	10.55	9.60	9.15	8.70	8.25	7.80
Over 50—100 lb.	11.70	10.80	9.95	9.20	8.40	7.75	7.50	7.05	6.75	6.45
Over 100 lb.	10.25	9.50	8.85	8.25	7.70	7.15	6.85	6.60	6.30	6.05
Coupler Carriers (See Note 2):										
Over 10—25 lb.	19.65	17.75	15.95	14.35	12.90	11.65	11.00	10.40	9.85	9.30
Over 25 lb.	14.70	13.35	12.15	11.10	10.05	9.20	8.75	8.30	7.85	7.50
Draft Lugs (short):										
Over 10—25 lb.	18.70	16.95	15.25	13.70	12.30	11.10	10.50	9.90	9.40	8.85
Over 25 lb.	13.95	12.75	11.60	10.55	9.60	8.75	8.30	7.90	7.55	7.15
JOURNAL BOXES	Prices will be quoted upon receipt of blueprints.									
Journal Box Wedges:										
Solid type	14.95	13.55	12.15	10.95	9.85	8.90	8.35	7.90	7.50	7.10
Cored type	16.85	15.25	13.70	12.30	11.10	10.00	9.40	8.90	8.40	7.95
Push Pole Pockets:										
Over 10—25 lb.	22.45	20.30	18.25	16.45	14.80	13.30	12.60	11.90	11.25	10.60
Over 25 lb.	16.75	15.30	13.90	12.65	11.50	10.50	9.95	9.45	9.00	8.50
Roping and Jacking Castings:										
Over 10—25 lb.	20.55	18.60	16.70	15.05	13.55	12.20	11.55	10.90	10.35	9.75
Over 25 lb.	15.35	14.00	12.75	11.60	10.55	9.60	9.15	8.70	8.25	7.80
Side Bearings:										
Over 10—25 lb.	21.50	19.45	17.50	15.75	14.20	12.75	12.05	11.40	10.80	10.15
Over 25 lb.	16.05	14.65	13.30	12.15	11.05	10.05	9.55	9.05	8.65	8.20
Striking Castings (See Note 3):										
Over 25— 50 lb.	17.50	15.90	14.45	13.20	12.00	10.95	10.40	9.85	9.40	8.90
Over 50—100 lb.	13.35	12.25	11.35	10.40	9.55	8.80	8.50	8.05	7.65	7.30
Over 100 lb.	11.65	10.85	10.05	9.40	8.75	8.15	7.85	7.50	7.20	6.85
Truck Columns:										
Over 25—50 lb.	18.15	16.55	15.05	13.75	12.50	11.40	10.80	10.30	9.75	9.25
Over 50 lb.	13.85	12.75	11.75	10.85	9.95	9.15	8.85	8.30	7.95	7.60
Miscellaneous Castings:										
Under 1 lb.	50c. ea.	44c. ea.	37c. ea.	33c. ea.	29c. ea.	25c. ea.	23c. ea.	22c. ea.	21c. ea.	19c. ea.
1— 2 lb.	50.00c.	43.30c.	37.00c.	32.70c.	28.50c.	24.75c.	22.90c.	21.35c.	19.90c.	18.60c.
Over 2— 5 lb.	37.25	32.70	28.80	25.35	22.35	19.65	18.25	17.10	16.00	14.95
Over 5— 10 lb.	26.10	23.25	20.75	18.50	16.50	14.70	13.80	13.00	12.20	11.50
Over 10— 25 lb.	22.45	20.30	18.25	16.45	14.80	13.80	12.60	11.90	11.25	10.60
Over 25— 50 lb.	16.75	15.30	13.90	12.65	11.50	10.50	9.95	9.45	9.00	8.50
Over 50—100 lb.	12.80	11.75	10.85	10.00	9.20	8.45	8.20	7.70	7.35	7.05
Over 100 lb.	11.15	10.40	9.70	9.00	8.35	7.80	7.55	7.20	6.85	6.60

Note 1: The bolster center filler price also covers bolster center braces, bolster center castings, bolster center diaphragms, center plate reinforcing castings, center plate supports and combined bolster center filler and backstop castings.

Note 2: The coupler carrier price also covers carry irons, drawbar carry irons and drawbar stirrup castings.

Note 3: The striking casting price also covers buffers, buffer blocks, buffer castings, deadblocks, deadwoods, striking blocks and striking plates.

Suitable pattern equipment is to be furnished by the customer unless 500 or more castings are ordered from one pattern at one time.

Note: Prices on castings for passenger cars will be quoted on receipt of inquiry and drawings.

TO SIMPLIFY RANGE BOILERS

Cooperation of Department of Commerce with Manufacturers to Standardize Sizes and Fittings

WASHINGTON, March 6.—Simplification of range boilers is proposed in recommendations made at a meeting held here Feb. 28 with the Division of Simplified Practice, Department of Commerce. Recommendations adopted follow:

1. "Short size" boiler (12 x 58 in.), now being used in New York (city) be eliminated.
2. Simplification of gas heaters to be referred to such companies as Ruud, Humphries and others.
3. Following list recommended as standard and to be issued as a simplified practice recommendation of the Department of Commerce:

Range Boilers

12 x 36 in.—18 gallons	18 x 60 in.— 66 gallons
12 x 48 in.—24 gallons	20 x 60 in.— 82 gallons
12 x 60 in.—30 gallons	22 x 60 in.—100 gallons
14 x 48 in.—32 gallons	24 x 60 in.—120 gallons
14 x 60 in.—40 gallons	24 x 72 in.—144 gallons
16 x 48 in.—42 gallons	24 x 96 in.—192 gallons
16 x 60 in.—52 gallons	

Expansion Tanks

12 x 20 in.—10 gallons	16 x 30 in.—26 gallons
12 x 30 in.—15 gallons	16 x 36 in.—32 gallons
14 x 30 in.—20 gallons	16 x 48 in.—42 gallons

4. ½-in. top and ¾-in. side and bottom tappings of vertical boilers be eliminated.
5. Within one year from this date, side spuds would be eliminated all together, and that three holes would be tapped in the top instead of two as now.
6. Not over five 1-in. openings to be considered standard for horizontal boilers.

Those present at the meeting were selected, upon proposal of the meeting, by R. M. Hudson, of the Simplified Practice Division, who acted as temporary chairman, as a committee for the entire industry in developing the recommendations which were adopted. The recommendations are to be submitted to all concerned for review and discussion, leading to ratification or acceptance at a later general conference, under the auspices of the Department of Commerce, of manufacturers, distributers and consumers, as well as others involved. Frank Sutcliffe of the John Wood Mfg. Co., Conshohocken, Pa., was appointed chairman of the industry to serve as a point of contact between members of the industry and the department. The Division of Simplified Practice will be used as a medium for getting recommendations before the distributers and consumers through their properly representative organizations. This will lead to a general conference of manufacturers, distributers and users in the early summer.

The conference was held at the request of the Fabricated Production Department of the United States Chamber of Commerce. Those present were: Victor Mauck and Frank Sutcliffe, John Wood Mfg. Co., Conshohocken, Pa.; Nels Gross and H. Allen Furst, Wolff Mfg. Corporation, Chicago; George A. Moore, Detroit Range Boiler & Steel Barrel Co.; E. M. Verner, Wm. B. Scaife & Sons Co., Pittsburgh; William Schulmerich, L. O. Koven & Brother, Jersey City; Robert T. Rock, Standardization Committee, National Association of Master Plumbers, Bridgeport, Conn.; John S. Nicholl, president Riverside Boiler Works, Inc., Cambridge, Mass.; E. W. McCullough and P. E. Holden, Fabricated Production Department, United States Chamber of Commerce; Dr. John M. Gries and F. P. Cartwright, Division of Building and Housing, Department of Commerce; R. M. Hudson, Division of Simplified Practice, Department of Commerce.

Annual Meeting Cincinnati Branch, National Metal Trades Association

The annual meeting of the Cincinnati branch, National Metal Trade Association, was held at the Business Men's Club, Cincinnati, March 1. The principal business was the reading of reports of officials and the election of officers. J. Wallace Carrel, Lodge & Shipley Machine Tool Co., was elected president; E. A. Muller, King Machine Tool Co., vice-president; L. G. Freeman, the Louis G. Freeman Co., treasurer, and David C. Jones, The Lunkenheimer Co., secretary. The executive committee will be J. B. Doan, the American Tool Works Co.; P. O. Geier, the Cincinnati Milling Machine Co., and A. B. Breeze, the Cincinnati Ball Crank Co.

Following the dinner, Prof. D. W. Dyer, Vanderbilt University, Nashville, Tenn., delivered an address on the wage problem, in which an "earned wage," and not a "living wage," was declared to be what a man is entitled to. The American theory, Professor Dyer said, is that every man should receive compensation commensurate with the value of his services. When, by any sort of organization or by legislation, he receives more than this, he is receiving that which he has not earned, that which is fruit of another's toil. The real exploiters of labor were declared to be those who are trying to substitute the so-called living wage for the earned wage.

Homer D. Sayre, commissioner of the National Association, briefly outlined, in an optimistic address, the present industrial situation. J. M. Manley, Director of the Cincinnati branch, also spoke, issuing a warning against inflation, the tendency toward which has been growing stronger within the last few months.

Quad City Foundrymen Meet

The Quad City Foundrymen's Association held its sixth meeting at the Harms Hotel, Rock Island, Ill., Feb. 19. A nomination committee of the following members was appointed to bring in nominations for officers for the ensuing year: William Seiffert, Moline Plow Co. (tractor dept.), chairman; H. Bornstein, Deere & Co., and Fred Zimmerman, Zimmerman Steel Co. Fred Kirby, chairman of the apprenticeship committee, made a progress report which brought out an interesting discussion on the subject.

The president called for reports from individual members on the testing of molding sand by the Eugene Smith method. The consensus of opinion seemed to be that Mr. Smith's method had a very practical value for the foundrymen and many expressed themselves as intending to put this method of testing sand into their plants as a standard practice.

The speaker of the evening was J. E. Nyhan, secretary of the Moline Y. M. C. A., whose subject was "The Man of Sand." He brought out vividly the fact that the foreman is an all important man since he is the point of contact between management and workers.

To Study Eyesight Conservation in Shops

Prof. F. C. Caldwell of the department of electrical engineering, Ohio State University, who is a recent addition to the governing body of the Eyesight Conservation council, is engaged in studies on illumination bearing upon the question of eye conservation. Surveys are to be conducted in workshops and schools. L. W. Wallace, executive secretary of the Federated American Engineering Societies, and Guy A. Henry of New York have been re-elected as president and general director, respectively, of the council.

Fall Meeting of American Electrochemists

The American Electrochemical Society plans for its regular fall meeting a trip on the Great Lakes from Buffalo to Mackinac Island and return. Stops would be made at Cleveland and Detroit. If the trip is decided upon it will be scheduled for Sept. 13 to 18. The round trip price is put at $51 including meals and berth. "Progress in Electrolytic Refining," covering copper, tin, lead, nickel, zinc and iron, is one symposium arranged for the fall meeting.

A continuous billet heating furnace and a pit wire annealing furnace will be installed at the works of the Gulf States Steel Co. by F. J. Ryan & Co., Philadelphia.

Important River Improvements Assured

Pittsburgh Pleased by Provisions of Appropriation Act to Carry Out Plans of Engineers Approved by Bureau of the Budget

PITTSBURGH, March 5.—Pittsburgh, especially its principal industry, iron and steel, is keenly interested in the Army Appropriation Act, signed by the President last Friday, since it carries an allotment of $56,589,910 for rivers and harbors, estimates of army engineers providing for the expenditure of $7,500,000 on Ohio River and $2,000,000 on the Monongahela River improvements in the fiscal year beginning July 1, next. Pittsburgh is pleased because it has been thoroughly demonstrated that the inland waterways provide a means of shipping the products of its mills and factories; that these arteries permit the steel manufacturers to serve the country much better than when dependence is put entirely upon the railroads, and that river shipments mean a reduction in delivered costs. It has been such a frequent occurrence in recent years that the railroads have for one reason or another failed under the load, and that need of some sort of supplementary service has been a crying one.

Pittsburgh steel manufacturers suffer as much if not more than those in other industrial centers from the breakdown in railroad service. They believe the remedy is in the supplementary service provided by the inland waterways, but if this service is to be for more than the brief periods when the rivers are high enough for navigation, it will be necessary that locks and dams be constructed to insure water of sufficient depth at all times, such as is proposed in the appropriation act.

Not a Part of the "Pork"

The money carried in the army appropriation bill for the improvement of rivers and harbors is provided in a lump sum. It is to be expended at the discretion of the Secretary of War and the Chief of Engineers, War Department. The amounts to be used in improving the Ohio and Monongahela rivers, however, were included in the estimates of the army engineers and were approved by the Bureau of the Budget. Consequently, these sums do not represent any part of the "pork" added by Congress, after being reported out of the House Committee on Rivers and Harbors, with an appropriation of $37,000,000, the amount approved by the Bureau of the Budget. Therefore it is taken as a matter of course that the Ohio and Monongahela will be improved under the appropriation provided and will not suffer by reason of the announced purpose of President Harding not to permit expenditures for rivers and harbors over and above the sum approved by the Bureau of the Budget.

Using the Rivers

Pittsburgh would like to see the rivers made navigable the year round and the iron and steel industry believes in the idea of getting away a portion of its products by way of the rivers. As indicative of the important place river transportation is taking in the handling of heavy raw materials for mills and furnaces and the shipping of heavy steel products to the market, there are now in the Pittsburgh district 84 steamboats and 1315 barges, the barges representing a carrying capacity equal to 19,725 freight cars. This, it is pointed out by steel company traffic men, relieves the railroads of almost 20,000 cars which ordinarily would be required to move coal, cement, steel, sand, gravel, oil, lumber and other Pittsburgh products.

A survey of the district by a leading constructor shows that orders have recently been placed for 300 steel barges requiring about 95,000 tons of steel. These standard barges are 200 ft. long, 35 ft. wide and 10 ft. deep and have a carrying capacity of 1000 tons.

Ten steamboats with steel hulls have been contracted for or are under construction. They are 175 ft. to 200 ft. in length with stern paddle wheels and while carrying no freight themselves, can push down stream 10,000 to 15,000 tons of freight loaded on barges.

Terminal facilities, under construction or contract, extend all the way from the stiff legger derrick on the river bank connecting with a railroad siding, to the most elaborate and expensive floating terminals.

One terminal now being built by the Carnegie Steel Co. on the Monongahela River, will cost in the neighborhood of $500,000, while two others for the Jones & Laughlin Steel Corporation at Pittsburgh and Woodlawn, Pa., are to cost $30,000. The terminal of the Wheeling Steel Corporation is to cost $200,000, and floating terminals, built jointly by the Federal Government and municipalities of Memphis, Cairo, Helena and Vicksburg are to cost approximately $2,500,000. There is also a project for a rail and river terminal at Louisville, Ky., on which about $500,000 is to be expended.

Survey of River Craft

A survey of the river craft shows the following additions within the past few months, and the number under contract:

Wheeling Steel Corporation, two towboats, ten barges; Carnegie Steel Co., two towboats, 150 steel barges; Jones & Laughlin Steel Corporation, 30 barges with contracts pending for two towboats; American Steel & Wire Co., 20 barges; Rodgers Sand Co., 10 barges; Patton-Tulley Co., Memphis, three steel logging barges; Pittsburgh Coal Co., 20 barges; Louisville & Cincinnati Packet Co., contract let for two steamboats; Barrett Lines, Cincinnati, one steamboat; Mississippi-Warrior Service, inquiry for 40 standard barges for Warrior River and 20 2000-ton barges for Mississippi River service; Standard Oil Co. of Ohio, two gas boats and fleet of oil carrying barges for the upper Ohio River.

Jones & Laughlin Steel Corporation Plans

The Jones & Laughlin Steel Corporation, which was the first of the steel companies to inaugurate delivery of its manufactured products in steel barges on the Ohio and Mississippi Rivers, will expend about $1,000,000 during the current year for new equipment and terminals, especially designed for this service.

Work is already under way in the Jones & Laughlin boat yard, in Pittsburgh, on the construction of 21 new type steel barges for the service, to cost approximately $300,000. A new oil engine harbor steamboat for handling barge movements between the Pittsburgh and Aliquippa works of the company has been ordered at a cost of $45,000. Two new all-steel steamboats designed for towing service in the Ohio and Mississippi Rivers have been designed and will shortly be ordered at a cost of $300,000. New river and rail terminals at the Pittsburgh works on the Monongahela River and at the Aliquippa works on the Ohio River have been designed and will be constructed during the spring and summer at a cost of about $350,000.

The new barges, which will be put into the steel delivery service upon their completion, will be 132 ft. long, 35 ft. wide and 10 ft. deep, with collision bulkheads and watertight compartments, and with a capacity of 800 tons each. Some of them will be open top for transporting steel pipe, structural shapes, bars, plates, and semi-finished material. Others will be

housed for carrying wire nails, barbed wire, farm fence, tin plate, and similar commodities.

The ninth Jones & Laughlin tow will leave Pittsburg harbor March 15, in tow of the steamer Aliquippa, and will consist of eight steel barges, transporting about 7000 tons of various products. Part of the contents of the barges will be transferred at Louisville and Evansville for transhipment by rail to points in the South and in Indiana and Illinois. The remainder will go on to St. Louis to be transhipped by rail to western points, and to Memphis for distribution by rail into the Southwest.

CAST IRON PIPE PROFITS

Report of United States Company Shows Large Increase—New deLavaud Plants

Net profits of the United States Cast Iron Pipe & Foundry Co. for 1922 were $1,022,242, compared with $100,841 in the previous year. Total earnings amounted to $1,497,866, after deducting $1,347,776 for upkeep of equipment, buildings, etc., and allowing for cost of operation, maintenance and taxes. The company continues in excellent financial condition, having net working capital as of Dec. 31 last of $4,408,284.

President L. R. Lemoine, in his statement to stockholders, attributed much of the industrial turbulence of 1922 to adverse labor conditions which crippled operations to an extent almost beyond belief. Profits accrued in large measure during the latter half of the year. The outlook on the whole is encouraging.

Mr. Lemoine states that there is more inquiry for miscellaneous lines and, as for the company's main product, cast iron pipe, "the year 1923 opens with heavy bookings." The works are now well supplied with orders, but unable to operate freely owing to labor shortage. Industrial prosperity in 1923 seems more and more contingent upon a satisfactory labor supply. "The present Three Per Cent Immigration Law, which it is even now proposed to change to 2 per cent, is working untold hardship. Industry suffers. Labor suffers. The public suffers. All are interdependent. Willingness to work is essential."

As to the market, he says: "There seems to be an unusual demand for iron and steel products with constantly rising prices. The law of supply and demand is thus in evidence. For the moment inflation is rampant; but in due time all this will change and it may be sooner than we think. Artificially maintained levels are likely to cause a buyers' strike. Lower wages and unemployment will follow."

The deLavaud Process

Since the installation of its first machine for casting iron pipe centrifugally by the deLavaud process about a year ago, the company has taken long strides in developing the method in the United States. Several new units have been installed and further expansion is being planned.

Notable progress has been made during the past year, Mr. Lemoine stated, in the development of the deLavaud process (for centrifugally casting cast iron pipe). As was announced in the last annual report, during the latter part of 1921 the company acquired the sole rights for the United States. The first machine was installed at the Burlington works about the middle of January, 1922, and has since been used largely for experimental purposes. There were naturally some kinks to iron out. There are still in process of development a number of improvements which will tend to perfect the process and lessen costs. The first commercial unit, consisting of four machines for producing, 6, 8, 10 and 12-in. deLavaud pipe, complete with annealing furnace, coating and testing facilities, etc., was installed during last summer at the Birmingham, Ala., works, and started up in a small way about the middle of August. Since October this unit has been producing about 500 lengths per day so satisfactorily that an additional installation of five machines was authorized at the January meeting of the Board. The demand for deLavaud pipe has largely exceeded the present facilities in spite of the fact that no special effort was made to press its sale. It is expected, as early as may be, to have 10 machines in operation at Birmingham. There, also, the company's licensee should shortly have four machines in operation. In addition to water and gas mains deLavaud pipe made with plain ends and couplings is expected to enter wider fields and find a market for pipe line service, especially where soils are not of the best. Initial orders for such service have already been placed. Owing to the demand for deLavaud pipe, it is expected to augment the company's facilities for its production. At the moment a 10-machine unit, to be located at the Burlington, N. J., works, is under consideration. Another such unit will probably be placed at or near the Addystone, Ohio, works, so that in due course the company should be producing this pipe at three centers, locations which offer attractions from the standpoint of manufacture and distribution. At the same time inquiry for the standard sand cast pipe continues, and will do so especially for the smaller and the larger diameters, not cast centrifugally.

Production of Coke in 1921

According to figures of the Census Bureau there was a sharp shrinkage in the output of coke plants in 1921 as compared with 1919, but the value in 1921 was more than double that in 1914. This does not include coke made in gas-house practice. Of the 176 active establishments reported in 1921, 84 were located in Pennsylvania, 21 in West Virginia, 12 in Alabama, 11 in Ohio, and smaller numbers in 17 other States. Table I shows the typical census figures for the operation of this industry, while Table II, compiled largely by the United States Geological Survey, shows output of the various products and by-products of the industry.

Table I—General Figures of Coke Manufacture

	1921	1919	1914
Number of establishments	176	278	231
Operating—			
By-products ovens	117	56	*
Beehive ovens	59	222	*
Persons engaged	19,183	32,882	23,463
Proprietors and firm members	27	41	36
Salaried employees	3,086	3,522	2,320
Wage earners (average number)	16,070	29,319	21,107
By-product ovens	12,414	15,553	*
Beehive ovens	3,656	13,766	*
Salaries and wages	$32,076,400	$49,905,100	$16,946,000
Salaries	8,243,400	7,605,800	2,657,000
Wages	23,833,000	42,299,300	14,289,000
By-product ovens	19,187,800	26,060,600	*
Beehive ovens	4,645,200	16,238,800	*
Paid for contract work	87,100	81,000	.....
Cost of materials	168,790,900	224,266,700	69,138,300
By-product ovens	146,792,900	146,110,800	*
Beehive ovens	21,998,000	78,155,900	*
Value of products	221,313,400	316,515,800	99,275,000
By-product ovens	191,371,200	204,492,400	*
Beehive ovens	29,942,200	112,023,400	*
Value added by manufacture (Value of products less cost of materials.)	52,522,500	92,249,100	30,136,700

*Not segregated in 1914.

Table II.—Production of Coke and By-Products

	1921	1919	1914
Coke, net tons	25,479,000	44,180,557	34,555,914
By-product coke, net tons	19,918,000	25,137,621	11,219,943
Beehive coke, net tons	15,561,000	19,042,936	23,335,971
Per cent of total—			
By-product coke	68.2	56.9	32.5
Beehive coke	21.8	43.1	67.5
By-product ovens, number	11,164	10,379	5,142
Principal by-products—			
Tar, gal.	253,051,649	288,901,739	109,901,315
Ammonia—		*	*
Sulphate, lb.	528,638,763	544,303,827	
Anhydrous or free ammonia, lb.	31,899,398	50,535,639	25,370,509
Sulphate equivalent, lb.	657,001,003	764,079,749	170,763,906
Gas, M cu. ft.	310,188,713	415,655,098	61,364,375
Benzol products—			
Crude light oil, gal.	76,917,269	92,473,409	.....
Benzol, crude, gal.	1,494,329	44,060,970†	.....
Motor fuel, gal.	48,052,882	.....	.....
Refined, gal.	4,912,131	17,006,532	.....
Toluol, crude, gal.	26,529	.....	.....
Refined, gal.	942,982	1,160,136	.....
Solvent naphtha, gal.	3,822,776	3,920,489	.....
Other refined oils, gal.	590,173	575,885	.....
Naphthalene, crude, lb.	2,827,756	3,579,998	.....
Refined, lb.	115,229	2,763,271	.....

*Included in sulphate equivalent.
†Covers both crude and motor fuel benzol.

November Imports Exceptionally Heavy

Iron and Steel Total 141,176 Gross Tons, or 4700 Tons Per Day —Pig Iron and Scrap Form 88 Per Cent—Year's Imports May Show a New High Record

WASHINGTON, March 6.—Despite the duties carried in the Fordney-McCumber tariff law, imports of iron and steel products in November, 1922, set what is perhaps a record movement of the kind in the history of the American iron and steel industry. Total imports were 141,176 gross tons, valued at $4,374,915, or an average daily incoming shipment for the 30-day month of approximately 4700 tons. This compares with total imports of 175,086 gross tons for the 40-day period from Sept. 22, the date the new tariff act became effective, to Oct. 31, or an average daily movement of approximately 4400 tons.

Imports of Iron and Steel into the United States (In Gross Tons)

Articles	Nov., 1921	Nov., 1922	11 Months Ended Nov., 1921	11 Months Ended Nov., 1922
Pig iron	2,193	98,767	23,126	328,717
Ferromanganese	270	6,192	8,818	89,432
Ferrosilicon	1,456	415	6,698	13,754
Scrap	2,777	25,575	39,550	114,367
Steel ingots, blooms, billets, slabs and steel bars	1,085	2,007	5,820	25,959
Rails and splice bars	2,406	1,377	21,154	25,637
Structural shapes	53	3,055	657	6,376
*Boiler and other plates	....	320	.....	994
Bar iron	80	2,113	1,676	6,919
*Tubular products	....	308	.....	614
*Round iron and steel wire	....	230	.....	512
*Castings and forgings	....	162	.....	321
*Nails and screws	....	27	.....	136
Sheets and saw plates	38	274	1,942	364
Tinplate	54	33	393	2,335
*Bolts, nuts, rivets and washers	....	4	.....	35
Wire rods	198	120	775	1,448
*Flat wire and strip steel	....	195	.....	214
*Wire rope and insulated wire, all kinds	....	2	.....	9
Total	10,610	141,176	110,609	618,143
Manganese ore	8,620	9,967	386,454	360,027
Iron ore	12,065	165,648	313,613	973,242
Magnesite	927	8,363	46,655	116,368

*Not reported separately, previous to Sept. 22, 1922.

The great bulk of the November movement consisted of pig iron, 98,767 tons, ferromanganese, 6192 tons, and scrap, 25,575 tons, as was to be expected, but the shipments were less in each instance than they were in the 40-day period, the respective totals at that time being 120,779 tons, 11,229 tons and 28,677 tons. It is believed that the imports of these products will continue to show a decline, as it is stated that large shipments were made against contracts, some of which now have been completed.

Machinery Imports by Value

	Nov., 1921	Nov., 1922	11 Months Ended Nov., 1921	11 Months Ended Nov., 1922
Metal-working machine tools	$5,840	$35,528	$200,856	$221,067
Agricultural machinery and implements	40,272	105,372	2,047,084	2,353,393
Electrical machinery and apparatus	26,643	112,603	313,087	540,380
Other power generating machinery	.....	92,357	.....	229,788
Other machinery	314,744	240,783	4,223,701	2,532,441
Vehicles, except agricultural	246,020	154,200	1,957,455	1,369,732
Total	$633,519	$740,843	$8,742,183	$7,246,801

For the 11 months ended with November, total imports of iron and steel aggregated 618,143 gross tons valued at $27,862,679, which also is thought to set a record for a similar period, and which represent almost one-third of the entire export movement of approximately 2,000,000 tons in 1922. Of the incoming movement during the 11 months, 328,717 tons, or more than 50 per cent, consisted of pig iron, 89,432 tons of ferromanganese and 114,367 tons of scrap. Of the total imports of pig iron in November, 44,531 tons came from England, 25,993 tons from Scotland, 12,548 tons from France, 11,875 tons from Belgium and 3818 tons from Canada. Of the total imports in November of ferromanganese, 6187 tons came from England and 5 tons from Germany.

Imports of Iron Ore by Countries

	Nov., 1921	Nov., 1922	11 Months Ended Nov., 1921	11 Months Ended Nov., 1922
Spain	....	12,501	5,602	52,437
Sweden	....	35,116	143,234	295,153
Canada	1,269	168	3,226	2,323
Cuba	10,790	45,157	123,222	321,646
Other countries	6	72,706	38,329	301,683
Total	12,065	165,648	313,613	973,242

When compared with imports of November, 1921, with certain items of minor tonnage importance omitted, those of November, 1922, showed an increase of about 1230 per cent, the imports of November, 1921, having been 10,610 tons, valued at $1,115 244. For the 11 months ended November, 1922, the total is practically 460 per cent over the total imports of 110,609 tons valued at $15,514,033 for the corresponding period of 1921.

Imports of Ferromanganese by Countries for 11 Months Ended November, 1922

	Gross Tons		Gross Tons
England	87,887	Norway	25
Germany	880	Sweden	5
Netherlands	500	Switzerland	5
Canada	90		
France	40	Total	*89,432

*Of this total 72,011 tons were imported from Jan. 1 to Sept. 21, 1922.

Imports of Pig Iron by Countries for 11 Months Ended November, 1922

	Gross Tons		Gross Tons
England	130,251	Netherlands	592
Scotland	84,315	China	500
France	33,934	Sweden	308
Belgium	59,689	Panama	141
Canada	14,760	Other countries	2,736
Germany	1,491		
		Total	*328,717

*Of this total 109,171 tons were imported from Jan. 1 to Sept. 21, 1922, the new tariff act becoming effective at midnight on the latter date.

Imports of manganese ore in November of last year totaled 9967 tons and for the 11 months they were 360,027 tons, while for the respective periods imports of iron ore totaled 165,648 and 973,242 tons, and for magnesite they were 8363 tons and 116,368 tons.

In connection with imports of manganese ore and ferromanganese, it is important that attention be called to the fact that, since they were made dutiable by the new tariff law on the basis of manganese content, the imports are weighed according to the manganese content only, while when they were free of duty the gross

shipments were recorded. In the case of 50 per cent manganese ore and 80 per cent ferromanganese, therefore, the actual gross shipments would be double and 25 per cent respectively more than the recorded weights under the new law. For this reason present comparisons of the imports of these products with the same products when they were free of duty cannot be made satisfactorily.

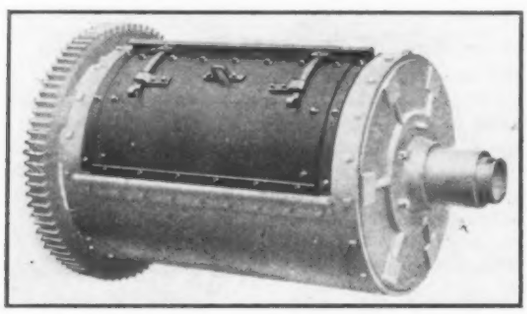
Imports of machinery made a gain over those for November, 1921, being $740,843 against $633,519. For the 11 months, however, there was a considerable falling off, from $8,742,183 to $7,246,801.

Improves Tumbling Mill Construction

Reinforcement of the shell and other parts and standardized construction throughout to permit of easy replacement of worn parts are new features of tumbling mills built by the W. W. Sly Mfg. Co., Cleveland.

The shell will be made up of a single plate rolled to shape and having the door cut out of the plate opposite the seam. A solid strip of metal, 7 in. wide, is left on each side of the door opening, overlapping by 3 in. the head casting and steel wearing plate. This leaves a door opening 8 in. shorter than the inside length of the barrel. The door opening is reinforced all around the inside and outside. This is said to prevent bulging of the barrel and to assure proper fit of the door continually.

Quick acting door fasteners shown in the illustration



The Shell Is Rolled From a Single Plate and Door Construction Strengthened. All parts are standardized

are used to hold the door in place. The door cover is made up of a piece of mill shell with an additional ⅜-in. plate, 1 in. large all around, riveted together and stiffened by rivets and angles. The head castings, with the trunnions, are inserted into the shell, trued up on a machine and held in place by stud bolts. The latter are emphasized as permitting of easy removal of the head and of thorough calking between the head and shell to eliminate shearing effects.

Heads, trunnions, gears and other parts are made to standard specifications, permitting of easy replacement of worn parts.

Steel Castings Sales Highest Since March, 1920

WASHINGTON, March 3.—Sales of commercial steel castings in January were the largest since March, 1920, according to reports received by the Department of Commerce through the Bureau of the Census, in cooperation with the Steel Founders' Society, from companies comprising over two-thirds of the commercial castings capacity of the United States.

Total bookings reported in January were 103,161 tons by firms with a capacity normally devoted to commercial castings of 96,200 tons, or at the rate of 107.2 per cent of capacity, as against December bookings at 71.1 per cent of capacity. Bookings of railroad specialties amounted to 47,879 tons, or 125 per cent of capacity, as against 73.8 per cent for December bookings. Bookings of miscellaneous castings amounted to 55,282 tons, or 94.3 per cent of capacity, and the largest amount booked in any month since records are available, in January, 1920.

Blackwood Electric Steel Corporation, Parkersburg, W. Va., has almost completed the construction of its plant and expects to be in production about the middle of April next. Alexander Blackwood, formerly general manager Farrel-Cheek Steel Foundry Co., is president of the company.

Chicago Silica Brick Prices Higher

PITTSBURGH, March 5.—Outside of an advance of $3 per 1000 in the Chicago district price of silica brick, refractories prices are unchanged. So prices of this grade in Pennsylvania and Birmingham have not been disturbed, but it is a frequent prediction that Pennsylvania silica will go to $45 per 1000 f.o.b. works by April 1, due to the fact that there is such a heavy demand, particularly in connection with the new by-product coke plants recently awarded. Since the beginning of the year, the Koppers Co., Pittsburgh, has taken contracts for by-product installations in Provo, Utah; Battle Creek, Mich.; Youngstown, Ohio, and Buffalo, and the Semet-Solvay Co., one for a battery in Hamilton, Ontario. Costs again are advancing on the manufacture of not only silica, but other kinds of refractories, chiefly in connection with labor, which is not readily obtained with wages more remunerative in other lines of endeavor. In a number of districts, shipments are restricted by the fact that it is difficult to secure common labor to do loading.

Low prices on Pennsylvania silica brick have pretty well disappeared. Observance of quotations on clay fire brick is fairly consistent, but it is said that capacity in the Missouri district still exceeds consumption and that there is more or less shading of prices. Quotations will be found on page 714.

Clay fire brick and silica brick statistics for the month of January, as compiled by the Refractories Manufacturers Association, make the following comparison, with the figures for December:

Clay Fire Brick

	January	December
Capacity reporting	74,090,863	75,056,974
Stock first of month	147,601,944 (199)	148,790,955 (198)
Production	61,080,954 (82)	51,195,502 (68)
Shipments	54,233,966 (73)	52,049,775 (69)
Stock end of month	154,448,932 (208)	147,936,682 (197)
New orders	62,858,194 (85)	49,179,054 (65)
Cancellations	1,737,322 (2)	617,593 (1)
Net new business	61,120,872 (82)	48,561,461 (65)
Unfilled orders	71,074,468 (96)	64,324,438 (86)

Silica Brick

Capacity reporting	22,784,167	22,998,333
Stock first of month	38,501,473 (169)	35,712,107 (155)
Production	11,935,280 (52)	11,503,726 (50)
Shipments	11,914,212 (52)	9,253,360 (40)
Stock end of month	38,522,541 (169)	37,962,473 (165)
New orders	15,861,405 (69)	13,041,931 (57)
Cancellations	266,356 (1)	2,005,890 (9)
Net new business	15,595,049 (68)	11,036,041 (48)
Unfilled orders	23,355,329 (102)	19,363,512 (84)

Gas and Electric Fixtures Made in 1921

Production in 1921 of fixtures for the use of gas and electric current was reported by the Census Bureau at a slightly higher figure than in 1919. The increase over 1914 was about 50 per cent, which is probably less than the increase in unit prices, and should therefore represent a slight reduction in actual volume of output. Of the 308 establishments in 1921, 97 were in New York, 41 in Pennsylvania, 31 in Illinois, 25 in Ohio, 24 in California and smaller numbers in 19 other States. The value of products was $42,890,000.

The Welland Alloy Steel Corporation, Ltd., Welland, Ont., will shortly commence operations there and employ in the early future about 2000 men. The company recently purchased the plant of the Electric Steel & Metals, Ltd., including a plant with two 7-ton Heroult electric furnaces, of a capacity of 15,000 tons per year. A third furnace of the same size and a rolling mill is to be added this year. The company proposes to manufacture nickel alloy steel from Sudbury ore, which contains the iron and nickel required in natural combination.

Facts Considered as Industrial Stabilizers

Importance of Leadership by Employers as an Antidote to the Walking Delegate—Cooperation and Mutual Confidence Essential to Harmony

BY ROBERT H. BOOTH*

A GROWING tree that is denied sunlight is no more unhealthy and unstable than is the industrial organization that is inadequately supplied with facts regarding the conditions, aims and accomplishments of itself, its industry and its employer. This infirmity and instability are unmistakable characteristics of the uninformed business body. Consequently the collapse of this feeble organism is usually numbered very early among the casualties that occur during every epidemic of industrial unrest.

Facts form the basis for the coordinated interest and common purpose that differentiate an organization from a crowd. The denial of facts affronts one of the most impelling and magnificent of all primitive human instincts.

For want of a better name we may term this dominant characteristic the instinct of workmanship. It is common to all mankind, whether bakers, bankers or burglars. While the direction of its development differs, its intensity in any man is limited only by his mental capacity. Where the instinct of workmanship is properly nourished it inspires the desire to excel, both at work and at play.

Present day employers generally complain that employees do not want to work and take no interest in the tasks which they are obliged to do. Articles philosophizing upon the "absence of the will to work" frequently appear in magazines and sometimes even in the daliy papers. Whether or not there is any more basis for this complaint today than when it was made before the war, or even 20 years ago, it is a fact that the average worker of today is fundamentally no different from his predecessor of former years.

During the last 20 years, our industries have attracted workers of many nationalities with widely different historical backgrounds. This extensive dilution may have slightly modified the points of view of our present industrial organizations. Such changes, however, have not been the only transitions and industrially they certainly have not been the most radical ones that have taken place since the beginning of the present century.

The marvelous development of the automobile and aircraft industry; the establishment of quantity production methods, together with a constant increase in the size of industrial units, have all been accepted and many of the problems connected with them have been attentively considered and carefully solved by employers in general. Unfortunately, however, many employers have developed attitudes of almost lethargic detachment with regard to the psychological adjustment of their organization problems.

Because of the great complexities of our modern social structure, American workers today need a higher order of constructive leadership than ever before has been contemplated. It is the employer's responsibility to fulfill this need. His failure to satisfy entirely the requirements of the situation is fraught with grave possibilities, certainly to industry, probably to the United States and possibly to modern civilization.

Every employer who honestly desires to free American industry and the American worker from the predatory practices and false teachings of the various self-appointed and speciously designated "benefactors of the workers," or "representatives of labor," must accept the leadership of his own organization, together with all the difficulties and discouragements that accompany the responsibility. Too often, the leadership of the false prophets has been imposed upon the workers because there was available no better leader under whom they might enlist.

The employer's acceptance of his leadership responsibility may not always bring industrial peace, but certainly it should give industrial justice. The latter is far more desirable in every sense from the standpoints of both present and future workers and managements. Furthermore, an intelligent and constructive leadership will assuredly restore "the will to work," which is a perfectly natural human condition. Uninterrupted concord is impossible and the apathy prerequisite to that condition makes it undesirable in human relationships. Moreover, there is no indication that tranquillity and peace ever did endure over any very extensive period of our industrial progress.

We hear many pleasing references to the relationships that existed between employers and employees in the days when plants were small and all the workers from manager to office boy were well known to each other. The implication generally suggests that those relationships were ideal. This is untrue—they were only very human and, being so, they were not always peaceful. As they were human, however, any disputes that arose seldom developed such malevolent bitterness as is experienced in impersonally operated modern industries.

Regardless of past industrial conditions, either fancied or real, our problem is one of the present and future. We must succeed with the workers of today. If they are incompetent and disinterested a way must be found to increase their skill and excite their interest. It is fairly certain that the problems of the past were no less difficult for those who struggled with them than our own problems are for us.

The average man today is moved by the same primitive instincts that actuated his forefathers. Different degrees of development of the various primitive human instincts characterize diverse races, nationalities and individuals. In our industrial life, however, we are concerned chiefly with the relative development of the five primal impulses denoted by the following indicative headings:

1. Instinct of self-preservation.
2. Instinct of workmanship.
3. Instinct of veneration.
4. Instinct of acquisitiveness.
5. Instinct of gregariousness.

While the order given is probably not far from the normal sequence of importance, this is a question of personal opinion, largely determined by individual experience.

Self-Preservation

The instinct of self-preservation is generally recognized and in many cases fostered by modern employers. Extensive welfare programs are maintained for its gratification. Unfortunately, however, not a few employers have assumed a paternalistic attitude in their zealous efforts to satisfy this characteristic. Such unseemly zeal alienates rather than coordinates the parties in interest.

Labor organizations clearly recognize the importance of mollifying this human characteristic. On every possible occasion, they vehemently dilate upon their accomplishments in this field.

This is the human characteristic which is gratified and attracted by a clean, well-ventilated shop or office and such other attractive conditions and policies as fair wages, steady employment, etc., all of which tend to put

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the mind at ease and thus facilitate the worker's concentration upon the task in hand. Effective accident prevention practice is also a highly important contributor to the gratification of this particular quality. "Slaughter house" is one of the mild appellations by which "public opinion" designates and classifies a plant with an unfavorable accident record. The importance of this factor can scarcely be over-emphasized. It would probably not be difficult to secure unquestionable evidence that workers avoid plants with unfavorable reputations for accidents.

A large proportion of the factors which promote the instinct of self-preservation are self-evident to the membership of any organization which conducts them. Consequently the facts need little premeditated publicity on the part of the management. Accident prevention is probably the single activity in this category which requires careful and constant exposition. Most of the large companies at least are giving it adequate and, in some cases, even noteworthy attention, with proportionately gratifying results.

Workmanship

The instinct of workmanship is undoubtedly one of the most powerful of all human characteristics. The scanty attention accorded it, however, is entirely disproportionate to its astounding possibilities as a constructive industrial force. In different phases of its manifestations it is variously termed personal pride, self-respect, egotism, conceit, etc. It is the instinct of workmanship in the expert mechanic that is gratified by the favorable regard with which his associates look upon the beautiful finish and ingenious design of his work.

Such an expert worker is often entirely engrossed in his craftsmanship. The attention and acknowledgment accorded his accomplishments increases the self-respect of its object. It also aggrandizes his manhood and stimulates all of those charactertics, alertness, loyalty, interest, industry, toleration, courage, and optimism, that have so largely contributed to bring the United States to its present preeminent position among the nations of the world.

Such gratification, in one instance in my experience, prompted an expert craftsman to assume the personal responsibility for the training and guidance of the recently employed trade school apprentice who inspired it. The student was deficient in experience, but manifested a sincere admiration and respect for the skill of the older man and an earnest desire to perfect himself in the niceties of his craft. The pupil eventually became an exceptionally able craftsman, a credit to his preceptor and a convincing proof of the constructive possibilities that may be realized by the animation of the primitive instinct of workmanship.

Every employer can excite this sentiment in his workers. By so doing he will create for himself equally congenial sentiments on the part of his own organization. To accomplish this result he must carefully secure, constructively use and equitably share, with his organization, the facts regarding the conditions, problems, aims and accomplishments of its industry, itself and each worker that it employs. Equitable use of such records contemplates the management's assumption of the responsibility for clearly interpreting them to those workers who might not otherwise understand or accept the logical conclusions to be drawn therefrom. By so recognizing the instinct of workmanship in his employees, the employer will record an appreciable advance toward industrial equilibrium and uninterrupted industrial development.

In his able article entitled "The Psychology of Labor," recently published in *Harper's Magazine*, Prof. Edward L. Thorndike designates the instinct of workmanship as "love of approval." He appraises its force in the following words:

> "Now this hunger for consideration, approval and eminence is one of the great moving forces in human life. Under present conditions in America, it deserves to be ranked along with the primary motives of physical hunger, sex and craving for physical safety and the intolerance of bodily pain."

A young steam hammer operator one day broke the production record. When he met the works manager, going home that night, it was the instinct of workmanship that prompted him to ask: "Did you hear how I made out today?"

This primal instinct is just as definitely characteristic of the least skillful laborer as of the most finished craftsman. Repression of the instinctive desire for approval often reacts differently upon the unskilled laborer and upon the finished craftsman.

As a balm to his own psychical needs, in the absence of adequate attention from his employer, it is common for a capable mechanic to set up his own standard by which to appraise his skill and measure the excellence of his own accomplishments. Such a self-established standard may not even remotely approximate the accuracy and comprehensiveness that a truly adequate measure should possess. Ill-judged as such an appraisal may be, however, it is infinitely more satisfactory than none at all. Consequently it is eagerly used as a basis of reckoning, in spite of the excessively narrow viewpoint which circumscribed its conception.

Contemplation and evaluation of his accomplishments through such a narrow perspective reacts upon the user. He becomes dogmatic and eventually establishes a reputation as a crank. The better the mechanic, the more powerful his instinct of workmanship and the more crotchety the continued use of inadequate standards makes him.

The less skillful worker, usually engaged on the simpler jobs and often on repetitive work, seldom possesses the qualifications necessary even to approximate a true appraisal of his own accomplishments. This incapacity of the employee, together with the indifference of the employer, are responsible for all of the so-called deadening effects to which the average worker in present day industry has been obliged to reconcile himself. Repetitive work is entirely satisfactory to a large number of workers. Moreover, the economies of its operation constitute a very positive benefit to modern society.

If repetitive work were distasteful to so many workers as are said to abhor it, the automobile industry would be obliged to curtail its operations greatly or to devise new methods of manufacture. Either of these alternatives would increase production costs to an extent that would seriously restrict the use of automobiles, because a large number of the present owners could not afford to buy them at the higher prices.

The spiritual apathy, that too often overwhelms the worker on non-repetitive as well as repetitive work, is a direct result of perfunctory industrial leadership and is not related to the work itself. Regardless of its generally mistaken cause, this spiritual apathy is a proper subject of the gravest concern to modern industry. The stricken despair that consumes the worker who is doubtful of the value of his industrial contribution is fittingly expressed by Carlyle in the following passage from "Sartor Resartus":

> "To me the universe was all void of life, of purpose, of volition, even of hostility: It was one huge, dead, immeasurable steam engine, rolling on in its dead indifference, to grind me limb for limb."

The unutterable misery of one in this condition can never be relieved by a simple raise in wages. It is undoubtedly the great tragedy of the worker in present-day industry. By the same token, it is the sword of Damocles suspended over the head of modern civilization. The line of demarcation that distinguishes the stricken despair of a leaderless worker in the modern social order from the scornful defiance of the convert to bolshevistic society is altogether too fine to be regarded with aloofness. The solution of the problem rests with the employers of the country. The situation is urgent and requires that the employer not only clearly appreciate his responsibility, but diligently address himself toward its fulfillment.

The possible effect of such constructive attention is illustrated by the following occurrence which came to my knowledge some years ago. A die-maker, a very good mechanic, worked in a small job shop in a Western

city. The shop employed about seven men, in addition to the owner, who also worked at the bench. The mechanic in question was voluntarily given a wage increase of 3c. per hr. in acknowledgment of his satisfactory service. He expressed no special gratification, but developments showed that the unsolicited expression of approval made a powerful impression.

A short time later this same man was offered a position as master mechanic in a much larger shop manufacturing metal specialties. His qualifications for the work were unquestionable, as he had had some previous experience in a plant of a similar nature although not in exactly the same position. However, without even inquiring the salary carried by the new position, the man declined the offer. He later stated that he had refused to change, because his old employer had recently given him an increase in wages without his being compelled to ask for it, and he was "getting along all right, anyhow."

Possibly the man himself may have honestly believed this to be the reason, but 3c. per hr. certainly did not hold him. Undoubtedly his instinct of workmanship was gratified by the voluntary acknowledgment of his accomplishments, symbolized by a raise in pay. Furthermore, he knew that the increase was not given as a perfunctory payment for his superior craftsmanship, because he had ample ocular evidence of the boss's struggle to meet the weekly payroll and therefore knew that money in that shop was not perfunctorily dispensed.

The natural everyday intercourse of employers and employees in a small industry brings about a direct interchange of information so that each is, in general, informed of the efforts and accomplishments of the other. Consequently in an entirely informal way there is communicated a gratifying acknowledgment of work well done. In a large corporation such a direct method of acknowledgment would be impossible, but a more formal yet equally valuable and satisfactory method can be established by every employer who desires to do so. It involves the determination of the facts regarding the underlying principles of the work being performed, and the codification and use of these facts as bases upon which to establish thoroughly adequate standards of workmanship.

The unfortunate effects of the employer's failure to secure the facts extends even to those in such supervisory capacities as foremen, department superintendents, etc. Unquestionably, the greatest treasure of latent possibilities in present day industry can be developed among such executives. They are far too frequently handicapped for want of essential information. They lack the facts necessary either properly to appreciate their responsibilities or to evaluate their accomplishments in such a way as to gratify and quicken the latent instinct of workmanship.

Veneration

The primitive instinct of veneration, which is listed third in importance on the foregoing tabulation, is the characteristic which prompts unswerving adherence to the leadership of an employer whose personal characteristics powerfully inspire the confidence of his associates.

In many instances the respect and veneration stirred in the employee by such an employer are largely responsible for the success of the organization. However, any such result is predicated upon emotion rather than on logic. Its effectiveness, therefore, is restricted to the comparatively small industrial unit, rather than the more extensive modern industrial organization.

Acquisitiveness

The instinct of acquisitiveness, while undoubtedly a very powerful human characteristic, probably is accorded a degree of attention entirely disproportionate to its importance. In order to stimulate accomplishment on the part of industrial organizations, employers have made more numerous and stronger appeals to cupidity than have probably been directed at any of the other human qualities. Its continued excitation inhibits the development of those characteristics of greater constructive possibilities. It places an entirely inconsistent value upon the purely material compensations of accomplishment. It often promotes discord instead of harmony, and separates rather than unifies the parties in interest.

In the form of wage incentives, in which it has been largely employed, the results have been fairly quick to materialize, but generally the accomplishments have been distinctly superficial. Unfortunately it has generally operated destructively, as a spur to goad to activity, rather than constructively, as a monitor to inspire intelligent attention.

Gregariousness

It is just as natural for the normal human animal to assemble for association with his fellows as it is for bees to swarm, fish to school, ducks to flock, wolves to pack or elephants to herd. Man associates with his fellows for defense, aggression, social enjoyment and mental improvement. Trained domestic workers have alleged greater opportunities for social intercourse, that are offered by factory work, as a reason for seeking the latter employment rather than continue in house work. The industrial unit which ignores the primitive instinct of gregariousness, possessed by all its workers, fails to utilize an extremely important basis upon which to establish the close cohesion and coordination characteristic only of the most perfect industrial organizations.

The wise present day employer long since recognized the utter impossibility of attaching workers to him and his organization simply by forbidding their membership in other affiliations. By affording opportunities for gratification of the fundamental human instincts within the unit, however, the broad-visioned executive has quickened the interest, strengthened the coordination and increased the effectiveness of his industrial co-workers. Insurance plans, safety campaigns, recreational activities, etc., while they are all important phases of welfare work, and thereby gratify the instinct of self-preservation, also, when properly administered, indulge the instinct of gregariousness.

Labor unions and other open and secret societies and affiliations of all kinds flourish largely because they cultivate and cater to this primitive human instinct. Their growth is generally proportional to the success of their executives in humoring the human characteristics of the membership. Industrial progress would be greatly facilitated, and industrial operation would be much smoother, if the executives would give more careful attention to the gratification of the fundamental human instincts, among which the instinct of gregariousness is a notable though probably the least important influence.

When Employers Fail to Cooperate

The results of the average employer's failure to accord the necessary direct attention to the five forementioned fundamental human instincts may be recognized both in the absurdly prolonged railroad shopmen's strike and the anthracite coal strike, which saddled such an unhappy burden upon the coal consumers of the country. In both cases an intermediary organization had successfully usurped the natural leadership of the employer in recognizing and offering the attention necessary to sustain properly those fundamental human instincts which are of such importance in modern industry. Neither of these strikes was economically justifiable, but they were ostensibly called to maintain an inflated wage scale, which objective the coal strike successfully accomplished.

This situation presents a striking contrast to that existing in some other industries, where wage reductions varying from 30 to 40 per cent have been made effective by the management, with the sympathetic acquiescence of the workers. This result was accomplished, in many instances, because the facts necessitating the changes had been so carefully explained to the workers that the mutual confidence between employer and employee was strengthened rather than shaken by the experience.

With the single exception of a large Eastern road, railroad management manifested its complete cognizance of the futility of an appeal to its own workers.

Throughout the strike, management concentrated its efforts upon repeated public assertions of the impregnability of the Government breastwork which shielded it from attack by its workers. The workers in turn skulked behind opposing fortifications erected for them by their labor organizations.

The present situation of the average railroad management is undoubtedly the result of its long continued attitude of impersonal detachment toward its workers. Long ago the normal cooperative relationship of employer and employee became so distorted that an outside agency termed organized labor successfully interposed itself between the estranged associates in the industry. The third party worked so industriously and intelligently in developing the estrangement that finally a fourth agency, the United States Government, was obliged to take a hand in the affair. As a result it is questionable today whether the railroads of the country are being operated by their managements and workers or by the United States Government and the leaders of organized labor.

In the coal industry, the employers were not so seriously hampered by Government interference as in the railroad industry. As a whole the coal producers, however, have shown no greater ability to get together with their own employees than have the railroad operators. Before the strike in the coal industry, the employers apparently had not decided upon any effective plan for presenting facts to their employees.

During the progress of the strike, the need for some method of communication was evidently felt. One of the large coke companies announced the establishment of a news headquarters in the Connellsville strike region. Although this report was later denied, further inquiry developed the fact that the news headquarters actually had been opened, but its activities were abruptly terminated before the project had really been given an opportunity to show any results. Offhand conclusions are seldom satisfactory in such highly important matters.

Employers in general are not sufficiently alive to the direct value of facts to their own managements. This is shown by the following list of quotations from the recent report of the Federated American Engineering Societies on "Waste in Industry":

> "The majority of the industrial plants studied lack knowledge of costs and have no cost control. Therefore there is no adequate method of judging fairly and accurately when improvements are needed and when waste is occurring. Not having the facts prevents prompt correction of defects. The above conditions are disclosed, for example, in the report of the metal trades. A survey of the printing plants in New York (city) made by the United Typothetæ showed that:
>
> "Fifty-six plants use standard cost system.
>
> "One hundred and eighty-seven plants with no cost system, but with a knowledge of all general costs.
>
> "Seven hundred and forty-one plants with no cost system and incomplete knowledge of all general costs.
>
> "Five hundred and fifty-four plants with no cost system and no knowledge of general costs.
>
> "The first two groups made money, the last two lost money, in 1919."

The general inadequacy of business facts is further emphasized by the following additional quotations from the report:

> 1. "*Faulty Material Control.*— . . . the methods of control which are common in the shoe industry account for the greatest loss in shoe production, with the possible exception of seasonal demand and production. . . . Still another waste from inadequate material control comes from speculative purchasing of raw material."
>
> 2. "*Faulty Design Control.*—The defective control of design results in a major waste, since it prevents standardization of product."
>
> 3. "*Faulty Production Control.*—The lack of adequate methods of production control is evident in every industry. It is one of the outstanding weaknesses."
>
> 4. "*Faulty Labor Control.*—With perhaps two or three exceptions, shoe shops have no department maintaining modern personnel relations with the employees."

In spite of this discouraging evidence, however, it is encouraging to note that farseeing employers are beginning frankly to admit and accept their responsibilities as leaders in the industrial world. Some corporations have established the custom of reporting annually to the workers the outcome of the previous year's operations. This is not done in any perfunctory way, but the presentation is made in a form that is agreed upon as most serviceable for presenting the information. Further instances are recorded where managements currently inform workers on such important points of mutual interest as relative to wages, selling prices of product, cost of materials, and amount of business on hand.

Such frankness and willingness to furnish facts of mutual concern to all those engaged in an enterprise will eventually establish a confidence that should become an incalculably valuable asset. Immediate signs of the accomplishment of this desirable condition need not be expected by those just inaugurating such a practice. It has been said that we are today suffering for the sins of our industrial forefathers. The worker's present lack of interest has not suddenly crystallized. It has established itself only as the result of the long period of management's lethargic detachment, and normal man to man relationship will be restored only by exercising the most energetic campaign of incessant cultivation.

General suspicion and occasional resentment must be anticipated in undertaking this guidance. To avoid this natural skepticism, particular care should be exercised, to insure the reliability of all facts presented and the conclusions drawn therefrom. A careless presentation is misleading. This is true whether the deception is deliberate or entirely unintentional. Even though an ambiguous presentation may be more impressive and entertaining than the simple exposition of existing conditions, entertainment is not essential in developing cooperation, and ambiguity should be avoided.

An illustration of loose practice in this regard is furnished by a large machinery manufacturing corporation which recently presented a graphic comparison intended to show the low prices at which its products are sold. The graph compared the price per pound of each of a number of other articles, such as pipe tobacco, cigarets, shoes, cuff links, automobiles, shirts, etc. The articles used are not comparable on the same unit basis because the same scale (pound) does not give a similar range of variation between the products enumerated. Such misleading information defeats the purpose of its conception.

Industrial demoralization is being constantly aggravated by inflammatory utterances directed from all vantage points between the soap box and the parlor. The enunciation of industrial sophistries, accompanied by either a blustering or a challenging manner, to suit the particular occasion, has become a highly remunerative occupation. The employers of the country have it in their power to nullify the effects of this misguided activity. They alone can firmly establish order out of the present chaos and restore the stability of the industrial structure of the country.

The prescription for this condition was clearly stated in the newspaper account of a recent speech by Charles M. Schwab, wherein he is reported to have said:

> "I believe that the first and prime need of every man engaged in industry is to get and to keep his own house in order and to secure the confidence and enthusiastic loyalty of his own men."

Certainly the speaker did not underestimate the fundamental importance of leadership as an obligation

of management and a right of workers. Leadership is necessary for the gratification of the instinct of veneration, inherent to a greater or less degree in every human being.

Obstruction alone will never heal the wounds caused by destruction. Construction is the only instrument that can succeed. Organized labor, as we know it, is one result of the present industrial situation of which the employers of the country are solely the cause.

Indeed, incessant vituperation probably benefits many so-called labor organizers and their organizations, because it advertises the only leadership that is available for the workers of many industries. On the other hand, every employer who actively sets about the constructive discharge of his responsibility definitely and effectively settles for his organization, at least, the question of the open shop or "American Plan."

MOLTEN FERROMANGANESE

Advantages from Use of Electrically Melted Alloy in Steel Making—Savings Possible—Use of Manganese Ore

BY FRANK HODSON*

IT is now generally agreed that it is very desirable to make molten ferromanganese additions to open-hearth and converter steels rather than to cold unmelted metal. Bessemer first recommended this, but the advent of the electric furnace has made it possible to do this in a simple and efficient manner. Ferromanganese is not an easy alloy to melt and handle when required intermittently, and it is probable the difficulties with the melting equipment that has prevented wider use of molten manganese. A properly designed electric arc furnace will solve many of the melting difficulties previously experienced and insure at a low operating cost supplies of real hot liquid ferromanganese.

The effect of such hot ferromanganese on steel either just before pouring it or in the ladle is very much more pronounced than when the cold alloy is added. In England, where several such furnaces have been operated for some time, and in Germany, where the complicated induction furnace, with its low power factor, is used for the same purpose, it has been found that the actual amount of ferromanganese used can be reduced 30 to 40 per cent in favor of the molten process. Coupled with this, the resultant steels have been freer from gases, occluded oxides and slag, and the waste and rejections have been much less.

This saving in actual amount of ferromanganese added to the charge is probably due to the fact that when adding the molten alloy it is entirely taken up by the steel and no part of it is lost in the slag or remains undissolved. It has also a greater deoxidizing effect than cold alloy and there is no cooling of the bath. There is no dissolving to be done, and if the molten ferromanganese is added in the ladle it can be poured without loss of time.

The resultant steels roll and forge more easily than when ferromanganese is added cold, as it is safe to say that if 0.50 per cent manganese were the minimum amount to enable a given steel to roll, probably if molten ferromanganese were substituted 0.35 to 0.40 per cent would give a steel that would roll easily. In addition to better quality of steel, to less amount of ferroalloy, and to absence of melting loss, additional savings can be made by the use of manganese ore, inferior fines and low grade ferromanganese. All these can be used in the electric furnace. In experiments made on a "Greaves-Etchells" furnace as much as 25 per cent of the charge was added in the form of manganese ore. The metallic melting loss rarely exceed 3 per cent.

With proper metallurgical manipulation of ferromanganese, it seems highly desirable to use an electric furnace with a large open bath rather than a restricted channel as in the induction furnace, and also one of which there is a circulation from the bottom of the furnace. It was found when only top heat was applied that the manganese had a tendency to segregate out and sink to the bottom, where it would stick. When the bottom connection on the furnace was cut in segregation ceased and the metal was uniform throughout in temperature and composition.

The voltage required on melting ferromanganese differs considerably from steel, and in order to keep a steady arc and if necessary to hold the furnace on low power input, it is important to have a furnace in which each electrode operates independently and which can keep steady arcs with only 20 to 25 per cent of normal electrode load. A 4-electrode furnace with one phase attached to furnace hearth, giving slow circulation of metal from the bottom, is ideal for ferromanganese or for any alloy or high-grade steel. Steel makers will undoubtedly appreciate the benefit to be obtained from use of molten ferromanganese and as the process involves an actual saving of money it will no doubt receive the attention it deserves from progressive management.

*President Electric Furnace Construction Co., Philadelphia.

Centenary of the Steel Pen

WASHINGTON, March 6.—The centenary of the modern steel pen industry recently was celebrated in Birmingham, England. Steel pens are made in France, in Germany, and in the United States, but the whole of the British manufacture is centered in Birmingham, says Consul John F. Jewell in a report to the Department of Commerce. Generation after generation of good workmen, son following father, developing by seven years' apprenticeship the skill he has inherited, can be traced back to 1822, when machinery was substituted for manual work in making steel pens. Prior to that time such pens had been made by hand and were available only to the well-to-do, costing as much as 5 shillings apiece, which at the then purchasing power of the shilling was equivalent to several of our present-day dollars.

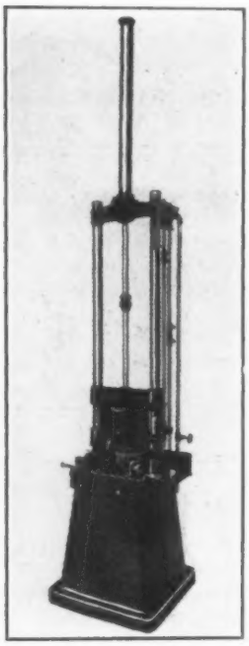
It is recorded that as far back as 1791 a Dr. Priestley of Sparkbrook had a hand-made steel pen, which was so highly regarded that its loss in the burning of his house is set down as a calamity. It was not until Joseph Gillott, John Mitchell and others invented the press tools and slitting machines for cutting pens wholesale from steel sheets in 1822 that the steel pen was brought within the scope of the ordinary writer. Even then the old quill pen died hard, and the new-fangled machine-made steel pen had a long and bitter fight to establish itself in popular favor. To this day there are old-fashioned Englishmen who persist in using the quill, but the progress of the new industry was such that by 1865 steel pens were being exported from Birmingham at as low a price as three-pence a half gross. In that year it is estimated that 2400 people were employed in the Birmingham industry. In the next 50 years the number doubled. In the first nine months of 1922 Birmingham pens were sent to the United States to the value of $244,603.

The crucible steel from which the pens are made is obtained from Sheffield. It formerly came in sheets, but now it comes in coils, ready cut and rolled. Some of the pen manufacturers have added fountain pens to their output, but this is a distinct industry whose main center is London.

Announcement is made by the Saco-Lowell Shops, Boston, that an increase in wages took effect Feb. 28 in its Lowell, Mass., Newton Upper Falls, Mass., and Biddeford, Me., shops. The amount of the increase has not been stated. What effect the wage increase will have on the molders' strike, which has been in force for some time, is problematical. Company officials say the increase will apply to every department, including foundry.

Pneumatic Gravity Drop Hammer

Economy of power and unusual flexibility are among the features claimed for the Da Costa pneumatic gravity drop hammer illustrated, a product of the Boston Hammer Co., Boston. The 200-lb. size is shown, but the machine is available in a smaller, a 100-lb. size, also.



An air compressor with one belt from the main line shaft or direct motor drive supplies power for one or several hammers, the size of the power unit varying according to the number of hammers. An automatic unloading device is provided on the compressor, causing it to run idle except as power is used. No belting, countershaft nor pulleys are a feature emphasized as eliminating transmission losses. The hammers may be set up in the most convenient place and in any position that can be reached by a pipe line. Several hammers may be operated from a main line of piping.

The operation of the hammer is controlled by a lever on the control rod at the right. Pulling the lever to the right releases the air and the hammer drops with all its force, and returns to position, ready for the next blow. Length of drop is adjustable by the turn of a binder and nut that is carried on the lift rod, adjusting the shut-off valve spiral on the back rod. The blow can be regulated from full to very slight by opening or closing the release air valve in front. A slight turn of the valve at the right will cause the hammer to rise to a desired height and as long as this valve is open the hammer will stay up indefinitely or until the end of the day, when from the gradual loss of air pressure it will descend without damage. An automatic check valve is provided so that if by accident the air should suddenly give out the hammer will be held up for several minutes, and finally descend slowly. This is emphasized as a safety feature. The hammer has a safety lever at the left, and cannot be tripped without using both hands, an arrangement intended to keep the operator's hands away from the hammer when it is descending. For setting dies, just enough air to lift the hammer may be admitted, and the hammer raised or lowered with one hand, the hammer being, it is said, practically balanced upon air.

The floor base of the machine illustrated is 24 x 26 in. The hammer operates on steel columns, encircling them as shown, and the columns are tied together at the top by a yoke, which carries the valve mechanism and the air tube. The length of hammer drop is 35 in., and the air pressure 75 to 80 lb. The height of the anvil from the floor is 31 in. and the total height of the machine 10 ft. 9 in. The space between the uprights is 13 in. The columns are of steel, turned and ground. The weight of the machine is 3600 lb.

Manufacture of Safes and Vaults

Steel safes and vaults to the value of $19,725,000 were manufactured in 1921 by 34 establishments employing 3547 wage earners, according to figures of the Census Bureau. There was a decided advance from the figures for 1919, in contrast with the shrinkage in most other lines of manufacture. Compared with 1914, the output increased by 172 per cent. Part of this increase, however, was due to greater unit prices. Of the 34 establishments reported, Ohio had more than half, with 19. There were three in New York, three in Pennsylvania and smaller numbers in six other States.

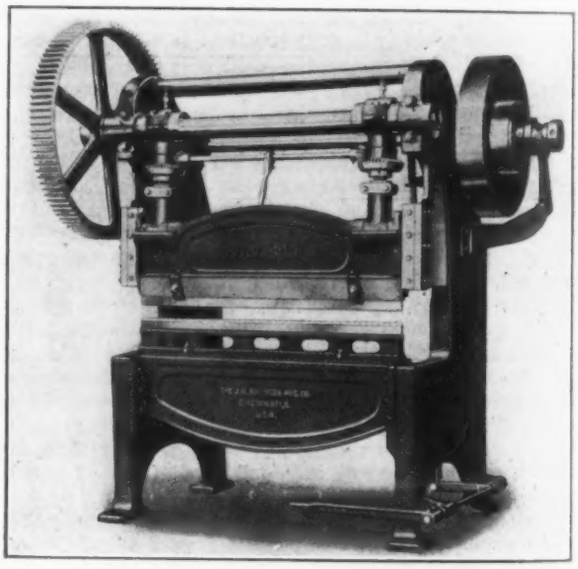
Central Steel Co. Expansion

The Central Steel Co., Massillon, Ohio, will extend its field of activities by engaging in the manufacture of special alloy steels for railroad service, in addition to its present line of alloy steel products. This company for some time has been making tests on alloy steels for axles and for helical and elliptical springs and for reciprocating parts for locomotives. Heretofore the company has confined its business largely to the automobile industry, but states that the demand from railroads for special alloy steel has prompted it to enter this new field. The department is under the direction of Irving H. Jones, formerly of Joseph T. Ryerson & Son, Chicago. The company expects to add to its mill facilities to take care of railroad business in alloy steels.

New Gap Forming Press

A new gap forming press or brake, of special interest perhaps to manufacturers of metal furniture or molding, and easily convertible into a gang punch, has been added to the line of J. M. Robinson Mfg. Co., Cincinnati. The dies used on the company's larger press type brakes may be used on the new machine, a feature intended to save time, power and wear on the heavier machine.

The press illustrated is 4½ ft. between housing. Two larger sizes, 5½ and 6½ ft. between housings, are also available. The main frames have a gap of 12½ in. from center of slide, which is a convenient feature where wide sheets are to be formed which are somewhat longer than the distance between the housings, or where metal is formed over the dies and must be removed by sliding from the end. The frames and arches are of gray iron. The crankshaft is a steel forging, with the cranks close against the main bearings.



Gap-Forming Press or Brake. It is adaptable to manufacture of metal furniture or moldings and may be converted into a gang punch

A powerful friction clutch is provided. Stepping on the foot treadle releases the brake and throws in the clutch; when the foot is removed, the clutch is thrown out and the brake applied. Both pitmans are adjusted simultaneously by means of a reversible ratchet device, an arrangement intended to prevent the necessity of getting the plunger out of line through changing the adjustment. The plunger is guided in jibs which are fitted, and may be adjusted to take up both side and end play.

The stroke of the slide is 3 in., the adjustment of slide, 2 in., and the distance of the bed to slide, stroke down, adjustment up, is 9 in. The height is 8 ft. 1 in. overall, and the weight of the press illustrated is 6600 lb.

British Practice in High-Speed Steel*

Some Phases in Its Manufacture and Heat Treatment— Electric and Crucible Processes Compared —Hardening Methods

BY H. K. OGILVIE

THE following notes deal chiefly with the manufacture of high-speed steel in the basic-lined electric furnace. Although the crucible is still largely employed as a melting medium the method is of little technical interest, being entirely a melting operation, as no refining is possible, and a small amount of sulphur is generally absorbed by the metal. Although this element is not quite so dangerous as in ordinary carbon steel it is nevertheless advisable to keep it under about 0.06 per cent.

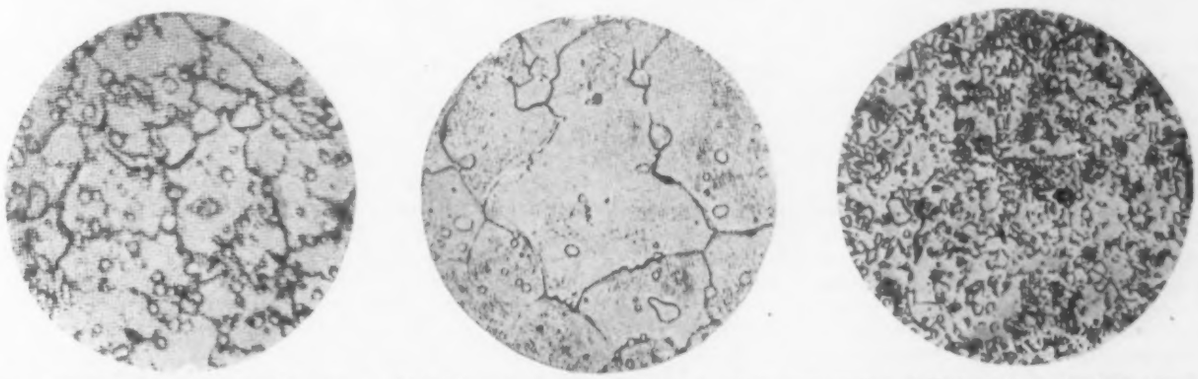


Fig. 1 (Left) Represents the Structure at 1000 Diameters at the Center of a ¼-in. square Bar of High-Speed Steel which Had Been Held at 1300 deg. C. for About 5 Sec. Fig. 2 (Center) at 1000 dia. is the structure of a similar bar kept at 1300 deg. C. for 35 sec. Fig. 3 (Right) represents a bar at 1000 dia. raised to 1300 deg. C.

Crucible and Electric Compared

The labor and fuel costs are extremely high, but the plant and overhead charges are much lower than in the case of the electric process. The cost per ton of sound billets, however, certainly is in favor of the small electric furnace, even when the latter is working only nine or ten hours per day. The steel properly made by the two methods seems to be equally good, and this is important, as the material cost is only a small proportion of the total cost of an average form tool.

Most of the crucible steel is cast into small ingots weighing up to a few cwts. each, and so long as the alloys have been completely melted there should be little segregation and few surface defects. When forged into bars for turning tools, small cutters, and drills, the structure should be fairly homogeneous and uniform throughout. It sometimes happens, however, that small particles of tungsten compound are not completely melted, particularly when tungsten powder is used. These form extremely hard spots having a Brinell hardness generally over 600 when tested with a 1-mm. ball and a load of 30 kg., and they persist throughout the subsequent operations and may completely destroy a fine-toothed cutter working on the otherwise soft material. It is thus desirable to introduce the tungsten by means of ferrotungsten or by the use of a tungsten-chromium alloy.

The electric furnace is commonly used for melting this class of steel, and the charge may consist entirely of high-speed steel scrap together with a small amount of turnings. The latter should be heavy and clean and are placed under the electrodes and on top of the scrap until a bath is formed. Where a large amount of tungsten steel turnings have to be used up, it is preferable to add them gradually to the charge after it has been melted, but it is very much more economical to use only good scrap, that is, heavy clean scrap with a high tungsten content, and to reject light and rusty turnings.

The Use of Turnings

To attempt to make good high-speed steel from turnings alone, or where the greater part of the charge consists of turnings, is not, in this country, commercially possible. One cannot determine with accuracy the percentage of elements present, and this may necessitate the addition of large amounts of expensive alloys. If the turnings are clean and oily the carbon in the metal when melted will probably be too high; if they are rusty it will be too low with considerable loss of chromium in the slag. The latter will be saturated with oxides and must be removed from the furnace, as time cannot be spent in reducing these into the steel. Even when using heavy clean turnings which can very seldom be obtained in bulk, the loss will be at least 10 per cent. With average turnings bought from a scrap agent the loss may be 20 per cent or more. Added to this is the difficulty of melting the turnings without breaking the circuit or damaging the bottom, together with the increased repairs necessary to the banks of the furnace. On account of the high current and electrode costs every suggestion which tends to shorten the length of each heat should be encouraged, consistent with making good steel, but in any case the time should not exceed 4½ hr. for a 3 or 4-ton furnace.

When good scrap is charged the melting slag is comparatively clean and need not be removed, and the sample for analysis can be drawn as soon as the bath has been stirred up. During the next hour, while waiting for the content of carbon, tungsten, chromium, and vanadium, a heavy lime slag should be carried without getting the metal too hot. Probably a small amount of lump ferrosilicon may require to be thrown into the bath to deoxidize the steel completely, and the slag should be kept as white as possible, taking care that it is heavy enough to prevent the coal or ground electrode which is sprinkled on it from passing through into the metal. During this time most of the sulphur is removed from the steel.

The electrode coolers should fit closely enough to

*From a paper presented at the September (1922) meeting of the Iron and Steel Institute in London, England. The author is with Alfred Herbert, Ltd., Edgewick Works, Coventry, England.

prevent the space between them and the electrodes acting as a chimney and drawing a stream of cold air through the furnace, having due regard at the same time to the slight variation in diameter of the electrodes themselves. With badly fitting electrode coolers, apart from the heat lost and the increased repairs necessary to the roof, the length of time required to reduce the oxides in the slag is prolonged while the consumption of electrode per heat is surprisingly increased.

The doors should be heavy and a good fit. Double arches may be used with the best silica brick inside the furnace and ordinary firebrick on the outside, the latter withstanding rapid change of temperature much better. A bricklayer accustomed to this class of work can keep down the cost of repairs enormously, and will seldom interfere with the normal working of the furnace.

In the case of furnaces having a bottom electrode where the bottom is often considerably weakened by iron spikes or metal to increase its conductivity, it is very important to remove completely any metal from pockets left after tapping the furnace. These should be carefully filled up with magnesite or dolomite mixed with a little busic slag and allowed to fuse partially. Where a furnace of the Heroult type is in use probably the best method of making the bottom is that employed for the basic open-hearth furnace, using oil burners if no other means of reaching the necessary temperature is available.

By the time the metal has been melted the percentage of carbon, tungsten, and chromium should be only slightly reduced but most of the vanadium will have been removed. The necessary amount of crushed ferrotungsten and ferrochromium is added as soon as the analysis is obtained, and the temperature of the steel is gradually increased. When the bath is in good condition enough ferromanganese is thrown in to give about 0.2 per cent manganese, and five minutes later the ferrovanadium may be added in a bag and well rabbled under the slag. The furnace should be tapped within the next 10 min. if the samples are quiet and the temperature sufficiently high, and no additions of aluminum or any deoxidizing compounds should be made to the ladle or molds.

Wild Steel and the Cause

Occasionally at this stage when getting the metal hot enough to tap, the steel, in some of the smaller furnaces especially, suddenly becomes wild, and if cast will rise over the tops of the molds even when considerable quantities of carbon, silicon, manganese, and vanadium are present. It is useless to attempt to deoxidize the steel with additions of ferrosilicon, etc., and the only method which has given successful results in the hands of the author is to cool the steel without any addition until after thorough rabbling samples taken at regular intervals show the metal to be sound. It may be necessary in some cases to allow cooling to proceed until the steel commences to solidify around the banks.

As this gas trouble has been quite widely known for a number of years, the author is rather surprised that so little mention of it has appeared in any of the home or foreign technical publications. Why high carbon steel containing up to 1 per cent of silicon and melted with every possible precaution should, without any visible indication, suddenly become so wild as to flow out of the test ingot requires some explanation, when the slag is apparently in good condition and practically free from oxide of iron. It is difficult to believe that the trouble is due to oxide of iron, which can scarcely exist in such large quantities in the presence of elements having a greater affinity than iron has for oxygen. Also a sample ingot, badly honeycombed, after forging and rolling, showed apparently thorough welding of the gas holes, and gave impact and bend tests equal to sound steel of similar composition. At the same time there is undoubtedly a reaction between the gases and the silicon and manganese present when the steel is sufficiently cooled with consequent slight reduction of these elements, but during the time the metal is hot and wild there is no greater oxidation of silicon, manganese, or vanadium than normally takes place with sound steel under approximately the same conditions. Also the milder the steel to be made the more liable is the trouble to occur, taking into account the slightly higher casting temperature of the low carbon steel. This may or may not be due to the fact that no carburizing material is added when the melting slag is removed.

While the temperature seems to be extremely important the method and rate of generating heat appears to be more so. No such trouble is met with in a furnace such as the Rennerfelt, where heating is done almost entirely by radiation, or in basic Siemens practise, where equal temperatures are attained so far as can be judged by the fluidity of the steel. The metal in the electric furnace is always hotter when the first slag requires removal than it is when ready to tap the furnace, and when a clean slag is put on and fused a small amount of ferrosilicon is sufficient to render the steel quite free from any tendency to rise in the mold. Yet as the refining proceeds and the slag becomes practically free from effective oxides, the danger of gas trouble appears to increase. In this way it is similar to overpoled electrolytic copper which, while theoretically free from oxygen, swells and evolves gases on solidifying. Although this gas trouble does not often happen with high-speed steel, attention is drawn to the fact that it is by no means unknown in arc furnaces.

It is important to remember that this class of steel oxidizes in the sample spoon more quickly than carbon steel, and allowance should be made for this when judging the temperature of the metal. No instrument gives very consistent results in practise when attempting to measure the temperature of molten steel, but it is very seldom that the usual pouring and film tests when carried out under the same conditions each time fail to give extremely good results. Where there is some doubt it is better to get the steel into the ladle too hot than too cold, especially if there is any device attached to the latter to regulate the speed of casting.

Octagonal Ingots Preferred

The ingots for each melt should not vary greatly in size, and octagon molds are to be preferred. Casting should be done from the top of the mold, having the metal in the ladle hot enough to permit the slag to rise to the surface, and as small a nozzle should be used as will pour the whole heat at such a rate that lapping of the ingots is just avoided, and no crust permitted to form on the surface of the steel as it rises in the mold. This allows the ingot to solidify in the most natural manner, preventing the formation of large tungstide network and keeping the pipe down to a minimum.

Bottom pouring may improve the surface of the ingot slightly, but as the whole ingot is in the liquid state when the mold is filled with the hottest metal at the bottom, partial segregation of tungstide results, to a serious extent when the tungsten is about 16 per cent or more, and the ingot is over 5 in. or 6 in. in diameter, unless the steel is dangerously cold. The waste of metal in the trumpet and runners, and the expense and time involved in using these, does not seem to be justified, and there is also the fact that this steel is much more searching on fireclay material than any other class of steel, and it is not uncommon to have a runner burst when the casting operation is almost completed, leaving only a shell of metal in the molds.

It is as well to keep the ingots under about 8 in. in diameter and 10 cwt. in weight. When it is necessary to cast both large and small ingots from the same ladle, the Batty nozzle attachment is very convenient and is also useful when the temperature of the steel has been misjudged. In any case when the ladle contains more than a ton or so of metal, one is justified in having two stopper rods, although the nozzles need not be of the same capacity. The sand used for testing the working of the rods must, however, be completely blown out of the ladle.

The ingots should not be allowed to become quite cold but should be transferred to the reheating furnace while they are still at a temperature of 200 deg. or 300 deg. Cent. So long as the ladle and molds have been kept clean no serious surface defects should be vis-

ible, and a quick examination is all that is necessary before heating for forging. The billets, however, after cooling slowly must be very carefully examined, and any surface cracks and other flaws removed by grinding a little deeper than is thought necessary. The care expended in this operation ought to yield a high proportion of sound rolled bars free from seams and also free from straight surface cracks which are visible only after the tool has been hardened.

It is not good practice to make fairly large thin cutters direct from forged bars unless the bore of the cutter is extremely wide. It is preferable to use a medium-sized ingot and to forge it in the usual manner to 4 in. or 5 in. round. A blank cut from this is then thoroughly forged until the required diameter is obtained.

Many large cutters made entirely of high-speed steel are not by any means ideally forged, yet the outside of the cutter where the teeth are machined has often a fairly good structural appearance. Toward the center, however, it becomes gradually coarser, and on hardening, fracture is liable to take place from the keyway in spite of the largest possible radius. Should there be no keyway, the cutter very often fractures when put to work. As this coarse structure is so easily detected under the microscope, and indeed very often with the naked eye on the polished and etched steel, the steel maker has no option but to replace any fractured material where it is present, even if the direct cause of failure be due to faulty hardening. At the same time there are few things so annoying as to have an intricate and eagerly awaited batch of cutters fail in the hardening operation, after considerable time spent on machining, and it is little satisfaction to know that the material will some day be replaced.

General Hardening Practice

The general hardening practice is to quench the part in oil from a temperature of 1250 to 1300 deg. C., and to temper it either in an oil-bath at 220 deg. C. or in a salt-bath at 600 deg. C. In certain cases the tool may be hardened in an air-blast or may be allowed to cool normally in the air, depending chiefly on the size and design and whether the slight additional scaling may be disregarded.

The majority of high-speed steel tools seldom approach their breaking-down point when cutting in ordinary works practice, and for these a 14 per cent tungsten steel with about 0.65 per cent of carbon and 4.5 per cent of chromium, with or without a small percentage of vanadium, gives quite satisfactory results, if hardened in oil from 1250 to 1260 deg. C. and tempered at 220 deg. C. Where a heavy duty cutter has to work at its maximum efficiency better results are obtained from an 18 per cent tungsten steel having 0.6 per cent carbon and about 4 per cent chromium with 1 per cent of vanadium. This is hardened in air or oil from 1300 to 1310 deg. C. and tempered at 590 to 610 deg. C., when it has the greatest amount of secondary hardness or capacity to resist softening, until the tips of the teeth reach a temperature of 625 deg. C. or a little higher, the exact temperature depending on a number of factors. Laboratory tests show that by tempering at 600 deg. C. the apparent hardness is not materially affected so long as the necessary hardening heat has been attained, while the cutting hardness is increased, the toughness or the resistence to shock, such as when the tool strikes the work, is substantially increased. Test-bars treated in this way show a toughness increase of 100 to 150 per cent over the same steel tempered at 220 deg. C.

Less harm is done to a fine-threaded tool by rushing it up quickly from 800 deg. to 1300 deg. C. when hardening than by soaking it for a minute or two at 1250 deg. C. In view of the fact that some articles may show softness after tempering at 600 deg. C., depending to some extent on the percentage of carbon and chromium in the steel, it is important to make quite certain of the exact hardening temperature. Under different lighting conditions and with different types of hardening furnaces, optical and radiation pyrometers may quite easily—and generally do—read at least 20 deg. C. wrong, so that a carefully calibrated platinum-rhodium thermocouple suitably protected should be used in the first case, and the radiation pyrometer checked against this. Time spent on standardizing the details of hardening is well repaid by obtaining more consistent cutting values.

The length of time that the steel remains at the hardening temperature is most important. Fig. 1 at 1000 diameters shows the structure at the center of a ¼ in. sq. bar, which had been held at 1300 deg. C. for five seconds as near as one could judge, while Fig. 2 (1000 diameters) is from a similar bar kept 35 seconds at 1300 deg. C. The difference in grain size can be easily seen, and while the first bar retained a load of 130 lb. with a deflection of 0.045 in. on 5 in. before breaking at the notch, the second bar withstood only 92 lb., the deflection being 0.033 in. A bar just raised to 1300 deg. C., although not completely austenitic at the center, withstood 142 lb. and showed a deflection of 0.052. Fig. 3 is a photomicrograph of this bar also at 1000 diameters. The usual tests for hardness gave no apparent difference in these bars.

On production work where a more or less constant amount of metal is passing through the hardening furnace, it is well to have the high temperature chamber about 10 or 20 deg. C. above the correct hardening temperature, so long as the time in this chamber is a constant for the same class of tool.

Tests of Actual Cutting Hardness

It is unfortunate that no rapid test exists for determining the actual cutting hardness of hardened high-speed steel. The file and the Brinell test are commonly used but are by no means satisfactory. Both are useful when always using a steel of very nearly the same composition hardened under standard conditions, but neither gives definite information as to the cutting properties of the tool. Both serve, however, to separate material within fairly wide limits. Cases are numerous where one method of testing gives quite a different impression from some other method. For example, a low tungsten steel (carbon, 0.65 per cent.; tungsten, 6 per cent; chromium, 6 per cent) hardened in oil from 1000 deg. C. is quite easily filed, although on a section 1 in. x ½ in. the Brinell hardness is 650. When hardened from 1300 deg. C. it is impossible to file it, although the Brinell number is not over 550. In both cases tools treated in this way cut high carbon annealed steel of 220 to 230 Brinell almost equally well. Similarly, an 18 per cent tungsten steel oil-hardened to give 550 Brinell will not resist wear so well as the same steel hardened and then tempered about 630 deg. C. to give 550 Brinell.

Scratch and rebound tests seem to give anything but consistent results, and it would appear that magnetic and electrical tests have not as yet been successful in solving this problem. A collection of all the known data from these tests would be valuable and might allow more work to be done in this direction.

Dominion Alloy Steel Corporation Formed

The Dominion Alloy Steel Corporation, Sarnia, Ont., has been incorporated with a capital stock of $15,000,000 by William A. Watson, Francis P. Dawson, William J. Knowles and others as provisional directors. The company recently completed payments to Indians for a site on the Indian reservation, and is preparing plans for the erection of a steel works there. As to when actual construction work will be started officials of the company are not prepared, at present, to make a statement, but it is expected that preliminary construction work will be started in the not distant future. G. A. Simpson, Hamilton, Ont., formerly connected with the Steel Co. of Canada, is interested in the new company.

Mill foremen of the Mahoning Valley have formed an organization which meets regularly at Youngstown and hears discussions on matters relating to shop management, employment, relationship between employer and employee, and kindred topics. R. E. Whitney of the Ohio Body and Blower Co., Cleveland, was scheduled to address a gathering Feb. 22.

HIGHER RAIL RATES

Advance in Combination Schedules Indicated by Decision of Commission

WASHINGTON, March 6.—The proposal of railroads to increase combination rates on iron and steel products from Pittsburgh and other points in western Pennsylvania to Cleveland, Lorain, Canton, and Akron, so that they will be equivalent to the existing through rates is expected by the Interstate Commerce Commission to be carried into effect. This was made apparent from a decision made public last Friday which dismissed the complaint of the American Shipbuilding Co. et al. against the Director General, Baltimore & Ohio et al.

The commission, holding that rates on iron and steel from points in the Pittsburgh district to the Ohio destinations named and to Buffalo were not unreasonable or unjustly discriminatory, said that it expects the carriers to eliminate the fourth section violations promptly. These relate to the so-called long and short hauls. It was pointed out by the railroads that they had completed a check on the numerous combinations which were lower than the through rates with a view to applying rates equal to the combinations until such time as all rates on iron and steel products throughout the territory could be increased to the full fifth class basis, on which iron and steel rates in official classification territory are fixed. Commodity rates, less than fifth class, particularly on short-haul traffic, in the steel districts of western Pennsylvania and eastern Ohio, it was pointed out in the decision, were put into effect years ago to enable the carriers to meet commercial or other kinds of competition.

The decision, in addition to the complaint of the American Shipbuilding Co., covered complaints of Frank A. Scott and J. O. Eaton, receivers, for the Standard Parts Co. and the Firestone Tire & Rubber Co. While the complaint protested against rates to Buffalo, no evidence concerning this was submitted and consequently the commission confined its report to the rate situation as it applied to the Ohio destinations.

The decision points out that prior to 1917, commodity rates were maintained on iron and steel products, and many of the rates on the fifth class basis were published as commodity rates for the sake of convenience. In that year, for the purpose of preserving existing commercial relationships threatened by the application of the fifth class, then about to be published, and on account of the outcome of the 15 per cent rate case, the commission authorized the carriers to cancel all commodity rates on iron and steel products, with the exception of so-called short haul traffic rates, applicable on business moving with the Pittsburgh district or between it and the Ohio districts. In consequence of the exception, through rates were made higher than the combinations. Further complicating the situation were the changes brought about by the general advance in rates effective June 25, 1918, when the class rate between Cleveland and Pittsburgh became 17c. and the combination on Youngstown became 15c.

On Aug. 26, 1920, as the result of another advance, the through rate became 25c. and the combination 21c., a violation of the aggregate of intermediate rule. Practically the same situation existed and still exists regarding rates to Lorain, Canton and Akron, and it is proposed by the decision to eliminate these violations of that rule.

Steel Spring Production in 1921

In common with other industries, there was shrinkage in the output of steel spring production in 1921 as compared with 1919, although the volume of products reported was almost three times that of 1914. Of the 126 establishments in 1921, 22 were located in Pennsylvania, 16 in New York, 14 in Illinois, 12 in California, 9 in Ohio, 8 each in Connecticut and Massachusetts, 7 in Michigan and smaller numbers in 10 other States. The table shows details.

	1921	1919	1914
Number of establishments	126	105	68
Persons engaged	6,535	10,401	4,240
Proprietors and firm members	88	55	46
Salaried employees	1,089	1,365	491
Wage earners (average number)	5,358	8,981	3,703
Salaries and wages	$9,959,000	$14,703,000	$3,459,000
Salaries	3,180,000	3,545,000	857,000
Wages	6,779,000	11,158,000	2,602,000
Paid for contract work	27,000	342,000	1,000
Cost of materials	16,007,000	28,019,000	6,143,000
Value of products	31,750,000	51,480,000	11,595,000
Value added by manufacture (Value of products less cost of materials.)	15,743,000	23,461,000	5,452,000

Exports of Railroad Cars

Reports of the Department of Commerce show for December the number and value of passenger and freight cars and mine cars shipped from the United States. The principal details are shown in the following table, which gives also the total shipments under each heading and the average value per car:

	Passenger Cars							
	Electric Railroad		Steam Railroad		Freight Cars		Mine Cars	
Destination	No.	Value	No.	Value	No.	Value	No.	Value
Poland and Danzig	..	.....	..	.....	579	$579,000	....	.....
England	..	.....	..	.....	....	.....	12	$8,240
Canada	1	$3,700	..	.....	40	44,100	....	.....
Honduras	..	.....	..	.....	....	.....	1	75
Mexico	..	.....	..	.....	30	44,913	109	22,173
Cuba	31	43,818	1	$2,200	90	95,110	6	570
Dominican Republic	..	.....	..	.....	....	.....	25	14,875
Argentina	..	.....	..	.....	200	533,145	....	.....
Brazil	..	.....	..	.....	5	1,990	....	.....
Colombia	..	.....	14	105,036	40	53,920	....	.....
British Guiana	..	.....	..	.....	70	21,000	....	.....
Peru	1	10,475	..	.....	....	.....	....	.....
Japan	4	4,741	..	.....	....	.....	21	4,840
Total	37	$62,734	15	$107,236	1,054	$1,373,178	174	$50,773
Average price		1,696		7,149		1,303		292

Pittsburgh Building Trades at Peak Wages

PITTSBURGH, March 5.—Building trade workmen here have been granted increases of from 5½c. to 12½c. an hour under the terms of an agreement reached between the contractors and the trades unions, dated March 1, which is to run for one year. Carpenters, who formerly received $1.12½ an hour are to receive $1.20; sheet metal workers go to $1.17½ until July 13, when the rate goes to $1.20, as against $1.12½ the old scale; cement finishers are advanced from $1 to $1.12½ to $1.12½ to $1.25; plasterers from $1.25 to $1.37½; electricians from $1.12½ to $1.20 and after June 1, to $1.25, and steam fitters from $1.12½ to $1.25. The scale for building trade laborers is yet to be established. These men now receive 50c. an hour and they demand 80c. Structural steel men want an increase from $1 to $1.12½ an hour, but an agreement has not yet been reached. The scales call for an 8-hr. day, with time and one-half for overtime work and double time for work on Saturday afternoons, Sundays and holidays.

Building trades labor is solidly unionized in this city, a condition that presents a strange contrast with that in the iron and steel industry, the city's most important one, which is on an open shop basis. An ineffectual attempt was made two years ago to establish the open shop in the building trades, the only result of which was a slight reduction in the scales and these are restored in the new agreements. There was practically no post-war liquidation of building trades wage scales and the restoration of peak rates, it is believed, creates a problem for other employers.

Purchases of Steel Companies Are Approved

Taking Over of Brier Hill and Steel & Tube Co. of America Favored by Stockholders—President Campbell Announces Large Improvement Program

YOUNGSTOWN, March 6.—Sales offices of the Brier Hill Steel Co., located in the principal cities, are now being consolidated with branch offices of the Youngstown Sheet & Tube Co., which has purchased the properties and other assets of the former corporation. The work of consolidation will continue through March. Services of most of the Brier Hill company's branch managers, executives and department heads will be dispensed with, as one of the chief reasons for the consolidation was the economy to be effected in sales and administrative departments.

Stockholders of the Sheet & Tube company, at their annual meeting Feb. 28, approved the purchase of the Brier Hill company and the Steel & Tube Co. of America, with headquarters at Chicago. Brier Hill shareholders had previously ratified the sale of their property and it is now formally in the control of the Sheet & Tube company. At a special meeting Feb. 28, stockholders of the Steel & Tube company formally sanctioned the sale of their assets to the Sheet & Tube company.

However, the actual transfer is being held up pending the outcome of an injunction secured by the Allied Chemical & Dye Corporation, New York, holding 16 per cent of the common stock of the Steel & Tube company. Hearing of the injunction suit is set for March 16 at Wilmington, Del. More than a majority of stockholders of the Steel & Tube company, required by law, have given their assent to the sale of their assets.

The contract with the Steel & Tube company provides that the Sheet & Tube company may form a subsidiary for the purchase. Sheet & Tube stockholders will hold an adjourned meeting March 19 to meet possible contingencies.

Terms of the Contract

Under the terms of the contract, the Sheet & Tube company buys Steel & Tube as of Nov. 30, 1922. After conclusion of the deal, the final date of which is set for April 2, 1923, unless extended by mutual agreement to July 2, 1923, the Sheet & Tube company will receive the income and pay the bills of the Chicago district independent from Nov. 30 last. According to President James A. Campbell of the Sheet & Tube company the total purchase price is between $56,000,000 and $57,000,000. The Youngstown independent pays $15 per share for the 967,330 shares of common stock of the Steel & Tube company, agrees to retire the approximately $17,000,000 of preferred stock of Steel & Tube at $110 and accrued dividends, and in addition assumes all the "debts, obligations and liabilities" of the Chicago interest, including a funded debt of approximately $23,500,000.

Neither the Brier Hill nor the Steel & Tube purchase will prove profitable for the Sheet & Tube company for a number of years, states Mr. Campbell, but he believes that after operating and other economies are effected, their acquisition will eventually prove most desirable. He announces that about $10,000,000 will be expended at once in the improvement of properties of the Steel & Tube company. Fully $25,000,000 could be expended in this manner, states Mr. Campbell, but the amount at first will be limited to $10,000,000.

Will Issue Bonds or Notes

Financing of the purchase of the Steel & Tube company will be handled by debenture bonds or notes and directors of the Sheet & Tube company were authorized to proceed with such an issue in an amount not to exceed $50,000,000. The sum of $33,000,000 will be required for the purchase price of the Chicago company and $10,000,000 for improvements.

The capital structure of the Sheet & Tube company was changed when stockholders voted to make the capital value of the 1,000,000 shares of no-par value $75,000,000 instead of the present $20,000,000. This was done in order that the stock would be more representative of the value of the properties.

The Sheet & Tube company has also increased its preferred stock from $10,000,000 to $15,000,000, and the increase will be used to retire $5,000,000 of preferred stock of the Brier Hill company.

President Campbell's Statement

The purchases of the Sheet & Tube company represent a book value of $150,000,000, and make the Youngstown producer the second largest independent in the country, ranking next to the Bethlehem Steel Corporation. Mr. Campbell commented on the properties to the effect that both need considerable rounding out before they will be profitable acquisitions.

"Wisdom of the action of the company in making these purchases will become apparent within the next ten years," he states. "Properties of the Brier Hill company will need rounding out before they will earn the dividends on the purchase price. For the time being, these will have to be earned by the Sheet & Tube company. Sheet & Tube properties, in my estimation, will earn enough to carry comfortably the purchase price, which is between $56,000,000 and $57,000,000. It is the future we must look into. For ten years I have maintained that the expansion of the steel industry is in the direction of the Great West.

"We have had the opportunity to buy a plant suitable to our purpose in the Chicago district. To be able to compete with concerns now having plants there or with companies which intend to establish plants there, we would be compelled to build a property in the West. The securing of ground and suitable location would have cost, in my judgment, at least $25,000,000. Other millions would be needed for the plant, which could not be ready within two years, if started immediately.

"Steel & Tube properties will earn all the fixed charges, including those on the money we put into them, while the additional finishing capacity to be built at once will increase earnings.

"Chicago plants have the advantage of an average of $3 per ton on finished products in freight rates, over the products of the Mahoning Valley. Pig iron can be produced more cheaply in the blast furnaces of the West than here, and under efficient management and with a large saving on overhead, I believe finished steel can be produced at the same cost as here."

Financial Report

The financial statement of the Steel & Tube company, made as of Nov. 30 last, shows total property valued at $78,957,000 and current assets of $27,238,000, making total assets of $108,425,000; a capital surplus of $29,729,000; funded debt of $23,500,000 and current liabilities, including a large bank debt amounting to $15,718,966.

Of the proceeds of a $10,000,000 bond issue of the Brier Hill Steel Co., made before its sale to the Sheet & Tube company, $3,000,000 was required to pay bank loans, while the rest is yet in the bank. The Brier Hill properties will be operated as a department of Sheet & Tube. The Brier Hill company has valuable iron ore deposits, especially Bessemer ores, of which the Sheet & Tube company stood in need.

Steel & Tube company plants are scattered in five States. Speaking of its plants, President Campbell says it has about everything but a golf course. It also owns a valuable zinc property.

Great Activity of Blast Furnaces in Pittsburgh and Nearby Districts

PITTSBURGH, March 5.—If the number of furnaces active is a criterion, this month should come pretty near establishing a new high record in pig iron production in this and nearby districts. In the Pittsburgh district proper, only two blast furnaces out of a total of 59 now are idle, while in the Mahoning and Shenango Valleys 37 out of a total of 47 are in blast. The western Pennsylvania district, taking in Johnstown, Kittanning, Josephine, Scottdale and Dunbar, Pa., has 17 furnaces, of which 11 are in blast and the Wheeling district, which contains 15 furnaces, has only five on the idle list. In the districts mentioned, there are 138 furnaces, of which 115 are active. This is almost the reverse of the middle of 1921, when only 25 furnaces were making iron.

In the past week or so, the active list has been swelled by six additions. The second furnace at the Donora, Pa., works, American Steel & Wire Co., recently was blown in, as was the Tod furnace, Youngs-Youngstown Sheet & Tube Co., Youngstown, Ohio, and Hannah furnace, Republic Iron & Steel Co. In the past few days, the Midvale Steel & Ordnance Co. started its ninth furnace at Johnstown, Pa., leaving only two stacks idle at that plant, while the one idle furnace of the 11 at the Edgar Thomson Works, Carnegie Steel Co., Braddock, Pa., was lighted Feb. 28 and the second furnace of the Pittsburgh Crucible Steel Co., Midland, Pa., was blown in the same night.

It is probable that before the middle of the month several other stacks will be making iron, since the Carnegie Steel Co. has ordered on three furnaces, which for one reason or another, usually a shortage of labor, have not yet started. These furnaces are at Niles and Bellaire, Ohio, and the Edith in Pittsburgh. The M. A. Hanna Co. furnace at West Middlesex, Pa.; the furnace of the Stewart Furnace Co., Sharon, Pa.; the second furnace of McKinney Steel Co., Josephine, Pa., and the stack of the Weirton Steel Co., Weirton, W. Va., are expected to resume production in the near future. The record of the active and idle furnaces, by districts, as of this date, follows:

Pittsburgh District

	Total Furnaces	In Blast	Out of Blast
American Steel & Wire Co.	4	4	0
Carnegie Steel Co.	34	32	2
Clinton Iron & Steel Co.	1	1	0
Pittsburgh Crucible Steel Co.	2	2	0
Jones & Laughlin Steel Corporation	12	12	0
National Tube Co.	4	4	0
Pittsburgh Steel Co.	2	2	0
Total	59	57	2

Mahoning and Shenango Valley Districts

A. M. Byers Co.	1	1	0
Carnegie Steel Co.	15	13	2
M. A. Hanna Co.	3	2	1
Reliance Coke & Furnace Co.	2	1	1
McKeefrey Iron Co.	1	0	1
Republic Iron & Steel Co.	7	6	1
Sharon Steel Hoop Co.	1	1	0
Sharpsville Furnace Co.	1	0	1
Shenango Furnace Co.	3	2	1
Stewart Furnace Co.	1	0	1
Struthers Furnace Co.	1	1	0
Trumbull-Cliffs Furnace Co.	1	1	0
Valley Mold & Iron Corporation	1	0	1
Youngstown Sheet &Tube Co.	*9	9	0
Total	47	37	10

*Includes 3 Brier Hill Steel Co. furnaces.

Western Pennsylvania District

American Manganese Mfg. Co.	2	0	2
Cambria Steel Co.	11	9	2
Kittanning Iron & Steel Mfg. Co.	1	0	1
McKinney Steel Co.	3	2	1
Total	17	11	6

Wheeling District

Carnegie Steel Co.	7	4	3
National Tube Co.	2	2	0
Weirton Steel Co.	1	0	1
Wheeling Steel Corporation	5	4	1
Total	15	10	5
Grand total all districts	138	115	23

The Newton Steel Co., Youngstown, is asking bids for the erection of 25 homes for workmen on property recently acquired near its plant in Newton Falls, Trumbull county.

Trumbull-Cliffs Furnace Makes New Production Record

In February, the blast furnace at Warren of the Trumbull-Cliffs Furnace Co., supplying hot metal to the open-hearth furnaces of the Trumbull Steel Co., produced an average of 776 tons of metal per day, establishing a new production record. This output compares with a per diem average of 753 tons in January, made with the use of iron ore exclusively. The February record was established by using iron ore and scrap in such proportions that of the daily output 722 tons of iron were made from ore and 54 from old material.

Last month, the Trumbull Steel Co. shipped a total of 31,000 tons of finished products, including 19,000 tons of strip steel, setting up new shipping records. Movement of finished materials is regarded as heavier than usual in view of the fact that there were but 24 shipping days in the month, two less than usual.

McKinney Steel Co. Awards Contracts for Two Blast Furnaces

The McKinney Steel Co., Cleveland, has awarded a contract to the William B. Pollock Co., Youngstown, for two modern, 600-ton blast furnaces to be erected at its plant in Cleveland. The new stacks will replace two old-type hand-filled furnaces which are to be dismantled. The work will be pushed with dispatch and the builders hope to have the furnaces completed within six months. The units will require between 4000 and 5000 tons of steel products, chiefly plates. This contract brings the total number of new blast furnaces sold by the Pollock company to replace obsolete units to seven, within the past year.

Carnegie Steel Co. Stacks

YOUNGSTOWN, March 6.—While no official pronouncement has yet been made that two more blast furnaces are to be erected by the Carnegie Steel Co., at its Ohio Works, Youngstown, there appears to be no doubt that the work will be authorized. Preliminary cost figures are now being assembled, for submission to the finance committee of the Steel Corporation.

Bar Iron Workers' Wages Raised

Bar iron workers will receive an increase of 2 per cent in wages for the March-April period as a result of the bimonthly settlement conducted Feb. 28 at Youngstown. The settlement affects directly all workers in mills operating under the sliding scale wage agreement of the Amalgamated Association of Iron, Steel and Tin Workers and the Western Bar Iron Association.

Examination of sales sheets disclosed an average price of $2.25 per 100 lb. on shipments during the 60-day period ending Feb. 20. This represents an advance of 5c. per lb., from the previous average revealed two months before. The tonnage rate for puddlers is advanced to $11.62 from $11.38, the rate which applied during January and February.

Wages on finishing mills are increased from 57 to 59½ per cent above base, in consequence of the settlement.

A year ago at this time, the bar iron average was 1.60c. per lb.

Monthly production of the Atlas Steel Corporation, Dunkirk, N. Y., is now between 1,500,000 and 2,000,000 lb. of high-grade steels, states President Louis J. Campbell. This will be increased to 3,000,000 lb. monthly upon the installation of additional machinery and equipment, which will be in working condition by May. An appropriation of $250,000 for this purpose was made last fall. The company is turning away new business, except that offered by regular customers, as its order books are well filled. It operates plants at Dunkirk, Charleroi, Pa., and Welland, Ont.

Machine Tool Shop Management Problems

Relations Between Productive Activity and Buying Booms and Slumps—Building for Stock—Remedy for Valleys in the Business Cycle Curve

BY ERNEST F. DU BRUL*

SOME of the machine tool builder's business adventures are due to the buyer, who helps to make the machine tool business a risky game by not knowing his buying job better.

The fluctuating nature of the demand for machine tools creates serious problems in different stages of the business cycle. It is evident that, the more regular an industry's demand, the lower can be its costs and the easier its managerial problems. The peculiarities of human nature as manifested in business cycles compel the builder of machine tools to face relatively short and sharp peaks of activity, followed by relatively long and deep depressions. The industry has a naturally bad load factor, for some very human reasons. The first is that most people do not look very far ahead, and most machine tool users are no different in that particular. Therefore, comparatively few users forecast their machine tool requirements to any great extent.

In a period of depression, the user's shop is more or less idle, and he has more than enough machinery to supply the restricted demand for his own goods. He is mentally so depressed by dull business that he cannot bring himself even to think of a time, just a few months ahead, when his business will be more active, when the natural growth of population and wants will demand more of his goods than he had been able to make in his last boom. Not forecasting what the future has in store, nor how long the depression in his own business will last, he simply will not spend money on plant improvements when he could be making them to the best advantage.

Buying New Equipment

Only as his orders become decidedly plentiful does the user of machine tools think of replacing old equipment or adding additional equipment. The necessity for more production, rather than the pressure for lower costs, seems to lead most men to buy new machines. Because the newer types are of greater productive capacity than the old ones, cost reduction follows, but this seems to be merely an incidental benefit, in the buyer's mind. As his own orders get to pressing him, he orders equipment, hesitatingly at first, then with greater confidence, then with insistence and, at the height of a boom, perhaps with reckless abandonment of caution. When he realizes that the end of his own boom is in sight, he not only stops ordering machinery, but may even try to cancel orders previously given.

Consider now the difficulties of the machine tool builder in trying to regulate his operations. At the height of his own previous boom, he had as full a force of men as he could get, working night and day. He had also a lot of contracts out for castings, and other material, placed far in advance, in large quantity, at high prices, to be able to supply his customers' wants without delay. Even though he had been quoting six to eighteen months delivery, his orders had been piling in on him with increasing speed. When his orders began to fall off, he had this large impending inventory thrown on his shoulders. Then he got many cancelations, from people who should have been compelled to live up to their contracts. If he was unwise enough to accept them he was stuck with large inventories in all stages of completion, but without sale.

Being of the adventurous rather than of the prudent type, and of the inventive rather than of the commercial turn of mind, he had not given much consideration to the progress of the business cycle. As the economics of the cycle had not been pointed out to him, he did not realize that his industry is among the first to slump in a cycle, and that the slump in machine tool orders is merely one of the signs of coming trouble elsewhere. He took counsel of hope rather than of prudence. It had cost him so much in money and effort to get his working force together that he hated to break it up. If his product was not of a type built only to order, he kept on working and built stock instead of shutting down his plant. Then, too, he had a goodly share of that human sympathy that leads any decent employer to keep his men employed as long as possible rather than to throw them out of work. Looking back now, he realizes that it would have been better, both for his men and for himself, to have shut down as his orders were filled, and to have waited to build his stock at the bottom of the depression rather than at the crest of a boom.

Shut-Down Unavoidable When Demand Wanes

When his own financial strength was threatened, even the most adventurous and sympathetic could no longer keep on producing, at high costs, machines for which there was no sale at any price. So the industry finally had to do late what it should have done early in the slump, that is, shut down and wait for improvement in conditions in other lines to revive demand for machine tools.

Pressure of creditors compels the financially weak to sacrifice goods to get money with which to pay their debts. A machine tool builder caught short of cash in a depression is in an extremely dangerous position. Clearing a stock of machine tools by a bargain sale is decidedly different from clearing goods that can be sold to the millions at a bargain price. Even small distress stocks can be moved only at ruinous prices. Potential users of a given size and make of machine are few and scattered, even in times of active demand. In a depression, demand from even these few potential users shrinks to a small percentage of what it was at the height of the boom.

Not only is the period of carry-over likely to be long, but another danger of carrying large stocks must be reckoned with. That danger lies in obsolescence of designs. Necessity is the mother of invention, and the necessity of getting work for idle shops always produces a good sized family of new and improved designs after a depression has been on for some time. When these are brought forth, their greater utility to the user kills the demand for the older types. In a depression, machines of new design can generally be made for less than the old types had cost in the boom. Even if not obsolescent, the replacement cost of the older type is less in a depression than it was in the boom.

Trying to Cut Prices

Some competitor who has no knowledge of unchangeable economic facts is almost certain to hatch the bright idea that, by making very low prices while his competitors are asleep, he can get a much larger participation out of a dull market than his natural participation had been in a more active market. He thinks he can thereby carry some of his overhead at their expense. But, as the competitors are not asleep, this bright idea fails to get the anticipated results. As all have a natural desire to keep their own places in the

*General Manager, National Machine Tool Builders' Association, Cincinnati. This is the concluding portion of a paper read by Mr. Du Brul at Philadelphia Feb. 27 before the American Society of Mechanical Engineers. The main part of his paper was published on page 597, March 1.

sun, they meet his low prices and all get that much less to carry overhead with. While all these factors lead to great losses in a depression, the low prices do not lead to much, if any, stimulation of sales.

For 15 months in the last two years machine tool volume was down to less than 15 per cent of what it had been in the first quarter of 1920. For 32 months past the demand has averaged about 23 per cent of that figure. In some cases, prices were made that would just about cover material and labor in attempting to coax out orders enough to hold a force of good men together. It was probably fortunate for some that their customers were not so keen for bargains as to fill up their shops at the low prices.

Some people think that, because demand for cheap automobiles can be stimulated by slight reductions in price, the demand for machine tools acts in the same way. The cheaper the automobile, the wider is the stratum of demand it can tap, until a saturation point is reached. A man who has just gorged himself with an elaborate dinner cannot be coaxed by bargain prices to sit down immediately to another one. He eats when his system needs food, not because food is cheap. Machine tool buyers in every cycle simply become "fed up."

Because of these long periods of depressions through which the machine tool builder must carry his plant and organization, he must put a heavy stand-by charge on his goods. He must cover this cost of necessary idleness, over which he has no control, by accumulating a reserve in good times out of which to draw in bad times. That reserve is cost, not profit. If he does not have such a reserve he goes out of business by the bankruptcy route. An investigation showed that, although they made a large part of the output, representative machine tool companies did not earn quite 9 per cent on their investment for 10 years preceding the war. All of those earnings could not be taken out in cash dividends. Most of the earnings were reserves to carry over depressions.

War-Time Expansion

Before the war, machine tool prices were very low compared to the utility they gave their buyers. The prices advanced with the war, but advanced far less than prices of most war goods. The industry made money, of course, but out of larger production, not out of excessive prices. The tax laws penalized the industry unjustly. The machine tool builders financed their own expansion, instead of asking the Government to do it. They now find themselves with expanded capacity that is much too large for any demand likely to arise in a few years. The pre-war demand was largely foreign, and that is gone. Likewise the rapid growth of the automobile industry required many machine tools, that have now been supplied. The second-hand market was glutted with all sorts of tools from dismantled war shops. All these factors have combined to make the machine tool business a very unhappy one for nearly three years.

Palliatives for Cyclic Depressions

As to remedies, the machine tool builders have few alternatives. The first is, to design something new and revolutionary that will make a new market by obsolescence of old types. Naturally, this is not easy, and very few of the companies will be able to work out this plan. Many have not the money.

The second is, by mergers and consolidations to reconcentrate the industry in fewer shops and reduce overhead in proportion. The 41 shops in the half million class, and the 134 in the quarter million class might do better if merged as 25 shops in the two million class.

The third alternative is to take on some entirely different product along with machine tools, which involves establishing an entirely separate selling plan, connections, etc—not an easy thing to do.

The fourth choice, for those who cannot for any reason take any of the other three, is to quit the field, before bankruptcy closes the shop doors.

As a result of the depression of 1921 and 1922, the wide-awake machine tool builder is giving close attention to the economics of his industry, and the nature of his demand. He is studying what to do and what not to do at various stages of his business cycle. He is contributing statistics whereby the stages of his cycle are disclosed. In his mind he is correlating his shop as a part of the industry, and his industry as a part of the big industrial machine that turns out goods of all kinds for the world's comfort. He realizes that his is one of the intermittent gears in the machine, and that as long as the other elements of the machine compel him to work so much more slowly at times, he must regulate his finances so as not to get caught in a squeeze. Such correlation will make a better industry with sounder, saner conditions than the machine tool builder has ever known, either in booms or depressions.

LABOR SHORTAGE REPORTED

Strong Demand for More Men from Many Pennsylvania Industries

HARRISBURG, PA., March 5.—Seven of the nine employment offices of the Pennsylvania Department of Labor and Industry report demands, most of them heavy, for iron and steel workers, according to the semi-monthly report to Royal Meeker, commissioner of the department.

The three days preceding March 1 are reported by the Philadelphia office to have developed one of the heaviest demands for labor since the depression of 1920. Both skilled and unskilled workers are needed.

All classes of workers, particularly molders and patternmakers, are desired in the Erie district. Virtually all plants, except stove manufacturing firms, have increased their forces since Feb. 1. Reports received from throughout the Harrisburg district indicate that virtually all mills are operating close to capacity. Men are needed in all departments.

The common labor shortage is acute in the Johnstown territory. All steel plants and metal industries of the district are reported exceedingly busy. McKeesport reports a decrease in the demand for skilled workers but an increased number of requests for common labor.

New Kensington reports all plants in its valley in operation. Foundry molders and good all-round factory employees are needed. Pittsburgh has a shortage of molders and chippers. There is virtually no surplus of high-class mechanics. In steel, tube and tin plate mills, the demand is slightly heavier than in foundries and shops.

Reading reports a need for experienced molders and brass polishers. The mills in the Scranton district are still adversely affected by the railroad shopmen's strike. Settlement of the strike on one of the railroads had been expected, but all hope was lost because workmen in two shops were not to be included in the proposed agreement.

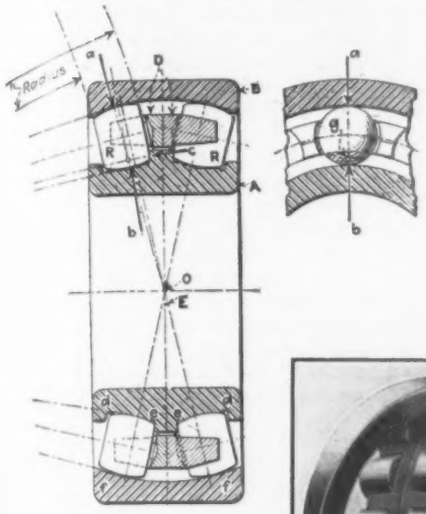
Contract for Manganese Ore Made by Tennessee Company

The Ozark Manganese Co., Duluth, Minn., of which Dwight E. Woodbridge is president, has sold its entire output in 1923 to the Tennessee Coal, Iron & Railroad Co. The shipment of one carload has already gone forward to Bessemer, Ala., under this contract. All of the stock of the Ozark Manganese Co. is now held by the American Ore Corporation, the owner of the Copper Buttes mine, Pinal County, Ariz. At its Ozark manganese mine in Independence County, Ark., developments have proceeded satisfactorily until the company now has in sight nearly 50,000 tons of ore averaging about 50 per cent manganese. There is also probably a larger quantity of washable material out of which, the company states, high grade ore can be made at a small cost. The latter material can be mined by steam shovel.

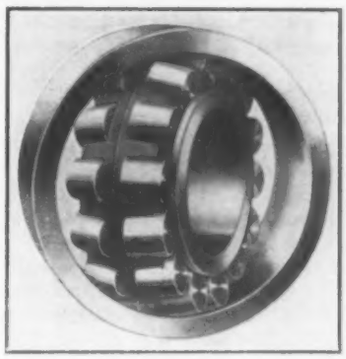
New Spherical Roller Bearing for Use on Heavy Machinery

A new spherical roller bearing for heavy duty service in connection with steel mill motors, rolling mills, tube mills, rotary furnaces, railway journal boxes, hoisting and other machinery, has been brought out by the S K F Industries, Inc., 165 Broadway, New York. The new design is intended to incorporate the desirable characteristics of both ball and roller bearings, and in equivalent sizes is said to have about twice the load capacity of the corresponding ball bearing.

The construction of the bearing may be noted from the illustrations. Part *A* is the inner race and is secured to the shaft or journal according to the usual



Details Of New Bearing Designed For Heavy Duty Service. It incorporates characteristics of both ball and roller types



Bearing With Inner Race Deflected Is Shown At Right

methods employed with ball bearings operating under corresponding load and speed conditions. The outer race *B* is ground spherical on the inner surface from the center point *O* of the bearing, and is mounted in the housing in the same way as a ball bearing, a slight clearance being provided to facilitate creeping of the race in the housing while in service.

The bearing is a self-contained and self-alining unit. When it is being installed no internal adjustment of the bearing itself is necessary, which eliminates the possibility of damage through initial maladjustment. Shaft deflections and inaccuracies in machining and locating the housing are compensated for in the self-alinement feature provided by the spherical surface of the outer race.

The rollers *R* are barrel shaped, and have their largest diameter toward the inboard end. On the inner race the roller contacts with groove *d e* throughout its length, thus providing the line contact of the roller bearing. On the outer race the roller contacts at *f*, and because of the closeness of the roller curvature radius *E f* with the race curvature *O f*, the contact is intimate and is comparable with that of the typical deep-groove type of ball bearing provided with a ball of very large diameter. There is a substantial area of contact between the roller and the outer race, due to the elasticity of those parts and consequent deformation under load. In this way the new bearing incorporates the theoretical characteristics of both the point contact of the ball bearing and the line contact of the roller bearing.

Parallelism of the axes of the rollers with the axis of the shaft is accomplished by means of the guiding flanges *e e* on the inner race. Both the flanges and the ends of the rollers are ground spherical surfaces, with their center at the point of intersection of the shaft axis and the axes of the rollers. The guiding flanges and the roller ends having the same center and the same radius of curvature, they contact over the area *g* shown in the end view illustration.

The arrows *a* and *b* represent the resultant forces on the roller from the outer and inner races, respectively. They are inclined to one another by a small angle which is the included angle of the cone circumscribing the roller. This means that there is a wedging force holding the roller in contact with the guiding flange and developing a reaction at *c* at the center of the area of contact with the guiding flange. As soon as a roller skews there is no longer a contact area between the end of the roller and the guiding flange. The contact is then at a single point on the edge of the roller and the force *c*, together with the resultant of the inner and outer reactions *a* and *b*, forms a couple which immediately counteracts skewing and returns the roller to its proper position. The rollers are maintained in a parallel relation wtih the shaft axis by this action.

The retainers *D* are carried on the land of the inner race and serve only to separate adjacent rollers and to prevent their contacting with each other. The thrust capacity of the bearing is obtained by angular contact of the load reactions *a* and *b* and is not dependent on the guiding flange reaction *c*.

Cleveland Engineering Society Will Visit Youngstown

The Cleveland Engineering Society will visit the plant of the Youngstown Sheet & Tube Co., Youngstown, Ohio, March 16, having accepted an invitation to spend a day at the plant, where the company will entertain the visitors at luncheon. This trip will come at the conclusion of a series of meetings on the iron and steel industry.

Dr. Walter Rosenhain, chief of the metallurgy department, National Physical Laboratory of Great Britain, will speak before the society March 12 on "The Structure and Constitution of Alloys," this meeting being under the auspices of the American Institute of Mining and Metallurgical Engineers. On the same date H. T. Watts, Steam Engineer, Otis Steam Co., Cleveland, will address the Cleveland section of the American Iron & Steel Electrical Engineers on "Possibilities in Stage Heating and Steam Extraction in Steel Mill Power Plants."

Coke Production Increased

UNIONTOWN, PA., March 5.—Coke production, especially the merchant output, continues to increase in the Connellsville coke region and the price is firm. Merchant production for the week ending Feb. 24 showed a gain of 2360 tons over production for the preceding week. Car supply for the coke interests continues fairly good, railroad preference for these producers being continued over placements to bituminous coal shippers.

Conditions in the region continue to be satisfactory. There is a surplus of labor due to the failure of the railroads to place adequate cars for coal loadings. Unless improvement is forthcoming, many mines will be forced to close. In fact, some mines already have suspended operations entirely.

Russian Iron and Manganese Ore Exports

The authorities have granted permission for the export during 1923 of 120,750 tons of iron ore and 48,300 tons of manganese ore. Before the war yearly quantities of about 660,100 tons of iron ore and 805,000 tons of manganese ore were exported.

To encourage home industry, the Government of Chile has decided to place an order for 2000 steel railroad cars to be built within the country, according to a cable to the Department of Commerce from Assistant Trade Commissioner Embry.

HEAVY EXPORT DEMAND

Japan Buys Rails, Pipe, Wire and Sheets—Germany Reported Buying American Steel

NEW YORK, March 6.—Demand from foreign markets continues strong in practically all lines, but in many instances, with the possible exception of Japan, the question of price is a serious obstacle. The Chinese market shows some improvement, but demand is still for exceedingly small lots, with the exception of second hand material and wire shorts. The high price of the former caused by the upward trend in the domestic scrap market makes sales difficult, and inability to obtain wire shorts from the mills is a problem generally encountered. Demand from South America is fair, but orders are generally small. Japanese buyers, however, are active in purchasing wire rods, wire and wire nails, pipe, rails and sulphate of ammonia.

Among the large inquiries current from Japan is a tender from the South Manchuria Railway Co. for 30 miles (4714 gross tons) of rails and accessories, c.i.f. Dairen, Manchuria. Bids were opened March 6. Inquiry for this tonnage was possibly necessitated by delayed delivery on the 110 miles of rails purchased by that company last year from three different German mills. It is reported that a representative of the South Manchuria Railway Co. has been sent to Europe in an endeavor to obtain shipment of this order, which was placed at about $32 per ton, c.i.f. Dairen. Evidently Japanese purchasers are not completely discouraged with delayed deliveries on German material, as it is now reported that the Nanki Electric Railway Co., which recently asked for bids on a small tonnage of heavy sections, has placed the order in Germany. The Keijo Electric Railway Co. has been receiving bids on a mile of 92-lb. grooved rails.

Japan Buys Gas Pipe

Japan has lately developed a demand for steel pipe. A current inquiry calls for about 1000 tons of gas pipe, 2-in. and smaller. One Japanese house has booked an order for 120,000 ft. of ½-in. to 6-in. gas pipe, and the export department of a large American interest has sold a few carloads of 12 in. steel pipe to a Japanese company.

Despite the current quotations, said to be as high as $109 per ton for light gage, black sheet orders are being booked in small lots, generally of from 100 to 300 tons. The demand for wire has been exceptionally heavy lately, orders ranging from 100 to as much as 400 tons and covering a wide range of sizes. A Japanese house reports the sale of about 385 tons of fence wire ranging from No. 8 to No. 22 gage. There is a good demand also for wire rods, which exporters are finding some difficulty in placing with mills. One exporter has in hand, it is stated, an order for 1000 tons of black sheets, but has only been able to place a few hundred tons with mills.

Some Canadian wire rods are available for export, but Japanese exporters are said to exhibit a preference for the product of mills in the United States. One American exporter recently received a firm offer of 1000 tons of wire rods from a seller in Hamburg, Germany, March shipment. The price was about $60 per ton, c.i.f. Japanese port. This might be compared with a recent sale of American wire rods to Japan at $70 per ton, c.i.f. Japanese port. An interesting inquiry was recently received by an American exporter for between 1000 and 1200 tons of ⅝-in. and heavier plates, metric specifications, from a European market. It is stated by an importer of pig iron that he is still receiving shipments from Hamburg, Germany, on a contract for pig iron, although arrivals are now irregular.

Foreign Pig Iron Prices High

The latest available quotations on foreign pig iron show Scotch No. 3 at $33.75 per ton, c.i.f. Atlantic port. An importer who has brought in some small tonnages recently offered a lot of Summerlee brand high silicon iron at $34.75 per ton, c.i.f. port. This iron analyses about 4 to 5 per cent silicon with phosphorus about 0.02 per cent. While French iron is no longer being received, even on contracts, it is unofficially reported that in a short time French furnaces will be in a position to offer export foundry iron at about $32 per ton, c.i.f. Atlantic port. That there is a growing possibility of exporting American pig iron to Europe is evidenced in a recent inquiry received by a dealer in New York from a London company for a small tonnage. It is believed that this is probably a "feeler" as to prices.

Reports of German Buying in the United States

German interests are quite evidently bent upon buying in the United States for shipment to their customers in foreign markets in fulfillment of contracts. In addition to numerous reports of American mills having been approached, it is stated by representatives of German interests in the United States that one large Ruhr steel corporation has two agents in this country who are instructed to place orders for finished material for South American shipment. It is believed that Hugo Stinnes, in addition to purchasing coal here, will shortly endeavor to place orders for steel to ship to South American markets on contracts, in order that the present complications in the Ruhr shall not cause the loss of these markets that have been partly regained since the armistice. German mills, prior to the occupation of the Ruhr, held contracts for shipment of semi-finished material to American West Coast consumers and these contracts may account for a recent report of negotiations by German representatives with a mill whose product is semi-finished steel.

Bronze and Copper Wire for Australia

The Australian Government is inviting tenders for the supply of approximately 700 tons of bronze wire and 1900 tons of copper wire for the Post and Telegraph Department, bids on which will be opened in Melbourne, April 10. Specifications and tender forms are obtainable from the office of the Commissioner of the Commonwealth of Australia, 44 Whitehall Street, New York, and in cases where manufacturers have no agents in Australia, bids will be received at the New York office until 3 p. m. April 10.

British Pig Iron and Steel Output in January

The production of pig iron and steel in Great Britain in January was 567,900 and 624,300 gross tons respectively. This is the largest output in both iron and steel since 1920. The pig iron production compares with an output in 1922 averaging 408,300 tons per month and with one of 855,000 tons per month in 1913. The steel ingot and castings output compares with 486,000 tons per month in 1922 and 638,600 tons per month in 1913. The January steel rate was therefore close to the pre-war volume. It is still considerably lower than the rate in 1920 of 755,600 tons per month.

British Pig Iron Output Last Year by Grades

The production of pig iron, according to grades, in Great Britain in 1922 as compared with the two previous years was as follows in gross tons:

	1922	1921	1920
Hematite	1,567,100	841,900	2,941,900
Basic	1,570,000	699,900	2,661,700
Foundry	1,173,400	747,400	1,457,300
Forge	278,200	239,700	605,000
Ferroalloys	196,900	52,000	244,000
Other grades	113,900	35,300	124,800
Total	4,899,500	2,616,300	8,034,700

Aluminum Ore Shipped to Europe

EAST ST. LOUIS, ILL., March 6.—Two thousand tons of aluminum ore, the largest shipment to leave East St. Louis since the war, went forward last week to Europe by the Aluminum Ore Co. of America. The company is now working on the remainder of a 4000-ton order. About 2000 men are now being employed at the plant.

The Twelve-Hour Shift in Industry

A valuable compilation of facts resulting from investigations of numerous industries—Need of preparation in shortening day is emphasized

REVIEW BY CHARLES M. MILLS*

The Twelve-Hour Day in Industry.—By the Committee on Work Periods in Continuous Industry of the Federated Engineering Societies, with a foreword by Warren G. Harding, President of the United States. Pages 302, 5½ x 8 in. Published by E. P. Dutton & Co., 681 Fifth Avenue, New York. Price $3.50.

Until a rather recent date there had been a surprising lack of knowledge regarding the length of hours in the group of some 40 or 50 industries where production is counted on throughout the 24 hours. There were no reliable statistics covering the 12-hour shift in these continuous process industries, and neither Federal nor State agencies have collected figures showing the number of 12-hour shift wage-earners. It is true that great masses of data on hours had been compiled, but State documents have generally covered union regulations which do not apply to continuous operation employees, and Federal census statistics are no more than a report on the *prevailing* hours in various establishments. While the better sources of information have been helpful in pointing out where a 12-hour day exists, they do not present an even approximately accurate picture of the extent or distribution of 12-hour work.

As proof of this paucity of information, almost all of the recent discussion regarding the 12-hour shift has centered around the iron and steel industry, as though the whole problem of the 12-hour shift existed only there. As a matter of fact, the extent of shift work is several times greater outside the steel industry than within it, and approximately as many men work 12 hours. Furthermore, the experience of these other industries in changing from two to three shifts is far greater, and the elimination of the remaining portion of the 12-hour day far more complicated.

An Important Survey

The general public, as well as manufacturers and industrialists, should, therefore, be deeply indebted to the recent survey of continuous process industries contained in "The Twelve-Hour Shift in Industry." This work is the fourth publication during the last three years relating to the question of the 12-hour day, particularly in the steel industry. The first study covering the experience of some 20 steel companies which had changed from two to three shifts was made under the auspices of the Cabot fund by Horace B. Drury and appeared in synopsis form in THE IRON AGE, Dec. 9, 1920. The second, a memorandum report issued from the Washington office of the International Labor Bureau, stated that the shorter day was completely established in 15 foreign countries. A summary of this report was published in THE IRON AGE, May 19, 1922. In 1921 Mr. Drury also completed an inquiry into the 12-hour shift problem of the larger steel manufacturers in the United States which was issued in proof-sheets by the Cabot Fund Trustees in 1922. In 1921, the Cabot Fund made a grant to the Federated American Engineering Societies to carry on the work contained in the book "The Twelve-Hour Shift in Industry."

Conducted by Committee

The study was conducted under the auspices of the Committee on Work Periods in Continuous Industry of the Federated American Engineering Societies. The members of this committee are: H. E. Howe, Chairman; L. P. Alford, J. Parke Channing, Morris L. Cooke, Dwight T. Farnham, Fred J. Miller, L. W. Wallace and R. B. Wolf.

*Curtis, Fosdick & Belknap, New York.

A foreword by President Harding heartily indorses the findings of the book, saying in part: "I rejoice to note the conclusions of this great body of experts are identical with those which I have reached from purely a social viewpoint. It has seemed to me for a long time that the 12-hour day and the type of worker it produces have outlived their usefulness and their part in American life in the interests of good citizenship, of good business, and of economic stability. The old order of the 12-hour day must give way to a better and wiser form of organization of the productive forces of the nation, so that proper family life and citizenship may be enjoyed suitably by all of our people."

Divided Into Three Parts

The book is divided into three parts: Part I contains a summary of detailed reports; Part II, a general survey of hours in continuous process industries other than iron and steel, with the experience of those manufacturers who had changed from two-shift operation to three shifts or other system; Part III contains the technical aspects of changing from a two-shift to a three-shift system in the iron and steel industry. The author of the Study of the Continuous Process Industries is Horace B. Drury, while Bradley Stoughton outlines the problems of the steel industry. Mr. Stoughton's work is an expansion of a summary published in THE IRON AGE, Sept. 14, 1922, while the iron and steel chapter of Mr. Drury's report was also reviewed in the same issue of THE IRON AGE.

Mr. Drury classifies the leading continuous industries into four main groups as follows:

Group I. Heat-Process Industries

Iron and steel	Lime
Non-ferrous metals	Brick
Glass	Pottery
Portland cement	

Group II. Chemical Industries

Heavy chemicals	Glue
Fertilizers	Drugs, etc.
Explosives	Electro-chemical industries
Dyes	Sugar
Industrial alcohol	Table salt
Wood distillation	Petroleum
Refined corn products	Cottonseed oil
Soap	Other oils

Group III. Heavy Equipment Industries

Paper	Automobiles
Flour	Textiles
Rubber	Mines
Breakfast foods	

Group IV. Service Industries

Power	Street railways
Gas	Telegraph and telephone
Water supply	Mails and express
Ice	Policemen, firemen
Shipping	Watchmen
Railroads	

General Basic Facts

The general basic facts regarding continuous process industries established in Mr. Drury's report may be summarized as follows:

1. There are over 40 continuous operation industries in the United States working more or less completely on a shift basis. They carry on from 5 to 10 per cent of the entire industrial work of the country.

2. The number of workers in these industries is relatively few, there being from 500,000 to 1,000,000 wage-earners on shift work.

3. There are 300,000 wage-earners working on 12-hour shifts. The total number on 8-hour shifts, out-

side of the steel industry, is considerably larger than the total number of wage-earners on 12-hour shifts.

4. The usual alternative to two 12-hour shifts is three 8-hour shifts, but other systems have been employed in a small degree, among them being:

a. Operation for a shorter period than 24 hours in a calendar day, and shortening the shifts to 10 or 11 hours each.
b. Arranging the completion of actual work in 10 or 11 hours on a nominal 12-hour shift basis.
c. Employing overlapping shift systems, thus securing three 9-hour or three 10-hour shifts in 24 hours.
d. Arranging a five shift plan on a basis of 9 and 10-hour shifts.

5. In the great majority of plants which have changed from two to three shifts, no technical difficulties have been encountered.

6. The following factors must be considered in changing from two to three-shift operation:

a. The disposition of the men to do more work per hour in the shorter shift.
b. The necessity for a higher quality of management which must prevail in 3-shift operation.
c. The fluctuations in individual earnings and labor costs.
d. The relation of general industrial and economic conditions to the time of the change in operations.
e. The relation of both work periods and wage rates for shift workers and day workers.
f. The number of working days per week.
g. The rotation of shifts.

7. Data covering the number of men involved in making the change in shifts are inconclusive because of variance in conditions.

8. Where good management and the cooperation of labor have been obtained, the effect of the 8-hour as compared with the 12-hour shift operation has been satisfactory. In practically every major continuous industry there are plants where a 25 per cent increase in quantity of production has occurred. Evidence also points to an improvement in quality, and a reduction of absenteeism and labor turnover.

9. Hourly wage rates have generally increased from 20 per cent to 25 per cent in 3-shift plants.

10. The weight of evidence points to the advantage of the 3-shift system.

11. Conclusive evidence proves that the extra leisure time gained by the men in the shorter working day is used to good advantage.

12. Only an almost negligible number of plants have reverted to the 2-shift operation after once adopting the 3-shift system.

Necessary Conditions in Changing From Long to Short Shifts—Steel Industry

In the Stoughton report, the following definite preparations are outlined as being prerequisite to changing the method of operation:

1. The equipment must be in a satisfactory condition to respond to increased intensity of operation.
2. The cooperation of workmen must be secured.
3. Necessary labor must be available.
4. The technical staff must be prepared to furnish full information regarding available labor-saving appliances.
5. Existing "bottle necks" must be eliminated and probable ones avoided.
6. Peak loads must be studied with special reference to the installation of mechanical appliances.
7. The change must not be made during a period of labor unrest:

a. After strife.
b. When bitterness exists.
c. When mutual confidence is lacking.
d. When labor is arrogant or elated by the defeat of management.

8. The change must not be made too suddenly.

9. Management must be able to exert a strong influence against:

a. Tardiness and absence.
b. Deliberate shirking.
c. Misuse of extra hours of free time.

10. Where possible, time studies of the work should be made to determine how much more the 12-hour crew could produce per hour if it worked with greater efficiency. The same hourly rate for eight hours, as for twelve should be paid, but a bonus should be added which will enable the men by becoming more efficient, to maintain their daily income.

General Conclusions of Both the Drury and Stoughton Reports

1. There is no direct relationship between the question of discarding the 12-hour shift system and adopting the 8-hour shift system. The mere mathematics of the situation or the division into three shifts of eight hours each have forced the situation.

2. The chief reason for abandoning the 2-shift system lies not in the extent to which it is used, but in the fact that the 12-hour shift is too long when measured by twentieth century ideas as to the proper conduct of industry. Decisions are influenced today by humane considerations as well as by the economic demand for that length of day which will in the long run give maximum production.

3. There is practical unanimity of opinion in industry as to the desirability of the change provided the economic loss is not too great. Conclusive evidence indicates that the change can usually be made at a small financial sacrifice on the part of the workers and management.

4. There is no applicable way of striking a balance between the losses and gains inherent in the change from the two-shift operation. Most assuredly, the change cannot be made advantageously by fiat. The change must take place slowly and with adequate preparation. With a carefully devised program of preplanning and with the cooperation of every one, gains will accrue to all concerned—workers, management, owners and the public.

5. The tendency throughout the world today is toward the abolition of the two-shift system.

6. In almost every continuous industry there are plants operating in comparison with 12-hour plants.

7. In a number of plants where there has been a successful operation on the three-shift basis, the management reports these results:

a. An increased morale on the part of workmen, both physical and mental.
b. An improvement in the class of workmen.
c. Less shirking, absenteeism, and labor turnover.
d. Better quality of output.
e. Increased output per man per hour.
f. Less material used.
g. Waste eliminated.
h. Longer life of equipment and less need of repairs.
i. Greater prestige with the public.

"The Twelve-Hour Shift in Industry" is recommended as a valuable addition to the library of every business man, economist, or industrialist who is interested in the economic and social feasibility of abandoning the 12-hour day in industry.

An unusual example of a booklet intended to emphasize the advantages of a definite location for industrial plants is one received from the Trafford Park Estates, Ltd., Manchester, England, devoted to Trafford Park, which is called "Britain's workshop and storehouse." The booklet is a notable achievement of the printing art, beautifully illustrated and devoted, of course, to the factory sites, the warehousing facilities and features of transportation in this notable industrial section of Manchester. The book has some 50 pages 8½ by 11 in. in size, and the artistic presentation of the facts and arguments are interspersed with numerous reproductions of photographs, sketches and maps.

The deeds for approximately 240 acres between Provo and Springville, Utah, have been received by the Provo-Springville Holding Co., and will be turned over to the Columbia Steel Corporation at once. The land will be used as a site for a steel plant. The corporation is now constructing a blast furnace and by-products coke ovens at Provo.

CONTENTS

March 8, 1923

Making Castings for Hudson River Tunnel 663
Quantity Production on Interchangeable Basis—Adaptation of Armor Plate Planer for Milling a Feature—Simplified Foundry Operations

Important River Improvements Assured 669
Pittsburgh Pleased by Provisions of Appropriation Act to Carry Out Plans of Engineers Approved by Bureau of the Budget

Facts Considered as Industrial Stabilizers 673
Importance of Leadership by Employers as an Antidote to the Walking Delegate —Cooperation and Mutual Confidence Essential to Harmony

British Practice in High-Speed Steel 679
Some Phases in Its Manufacture and Heat Treatment—Electric and Crucible Processes Compared—Hardening Methods

Purchases of Steel Companies Are Approved 683
Taking Over of Brier Hill and Steel & Tube Co. of America Favored by Stockholders—President Campbell Announces Large Improvement Program

Machine Tool Shop Management Problems 685
Relations Between Productive Activity and Buying Booms and Slumps—Building for Stock—Remedy for Valleys in the Business Cycle Curve

Germans Planning to Do Without Ruhr 696
Arranging for Fuel Supplies from England and Silesia and for Using Brown Coal—Eastern Outlets for Iron and Steel and Other Industries

February Pig Iron Output 698
Highest February on Record—Daily Average 106,935 Tons—March 1 Rate Over 40,000,000 Tons

Freight Car Steel Castings Advance.... 667
To Simplify Range Boiler Sizes..... 668
Annual Meeting Cincinnati Branch, National Metal Trades Association..... 668
Quad City Foundrymen Meet..... 668
Fall Meeting of American Electrochemists 668
Jones & Laughlin Steel Corporation Plans 669
Cast Iron Pipe Profits..... 670
Production of Coke in 1921..... 670
November Imports of Iron and Steel..... 671
Improves Tumbling Mill Construction.... 672
Steel Castings Sales Highest Since March, 1920 672
Chicago Silica Brick Prices Higher..... 672
Gas and Electric Fixtures Made in 1921.. 672
Molten Ferromanganese..... 677
Centenary of the Steel Pen..... 677
Pneumatic Gravity Drop Hammer..... 678
Manufacture of Safes and Vaults..... 678
Central Steel Co. Expansion..... 678
New Gap Forming Press..... 678
Dominion Alloy Steel Corporation Formed 681
Higher Rail Rates..... 682
Steel Spring Production in 1921..... 682
Exports of Railroad Cars..... 682
Pittsburgh Building Trades at Peak Wages 682
Activity of Blast Furnaces in Pittsburgh and Nearby Districts..... 684
Bar Iron Workers' Wages Raised..... 684
Labor Shortage Reported..... 686
Contract for Manganese Ore Made by Tennessee Company..... 686
New Spherical Roller Bearing for Heavy Machinery 687
Cleveland Engineering Society to Visit Youngstown 687
Coke Production Increased..... 687
Russian Iron and Manganese Ore Exports 687
Heavy Export Demand..... 688
British Pig Iron and Steel Output in January 688
British 1922 Pig Iron Output by Grades.. 688
Aluminum Ore Shipped to Europe..... 688
The Twelve-Hour Shift in Industry..... 689
Editorials 692
Who Pays for Higher Living?—International Trade in Steel—Congestion of the Courts—Ultra-Special Machine Tools—Mutual Benefit Associations.
February Iron Output 692
Correspondence 695
Galvanizing Wire.
Southern Metal Trades Association Meets. 695
Steel Plant Engineers to Discuss Oxygen and Hydrogen Production 695
Plated Ware Made in 1921..... 695
Current American Shipbuilding..... 695
Steel Furniture Shipments Increasing.... 714
British Iron and Steel Market..... 716
Fabricated Steel Business..... 717
Railroad Equipment Buying..... 717
Trade Changes—Plans of New Companies 730
Industrial Finance 731

Iron and Steel Markets 700
Comparison of Prices 701
Prices Finished Iron and Steel, f. o. b. Pittsburgh 713
Prices of Raw Materials, Semi-Finished and Finished Products 714
Non-Ferrous Metal Market 715
Personal Notes 718
Obituary Notes 719
Machinery Markets and News of the Works 720
New York Jobbers' Prices 732

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Who Pays for Higher Living?

It is well recognized that the doctrine that there would be "a higher plane of living" after the war and on account of the war is not merely unsound economically but impossible. By brightening men's intellects and making them work harder, a war may cause greater production. If after the war men retain habits of industry and economy, and if the war brings inventions making for greater efficiency in the expenditure of man-power, then the higher plane of living can come.

Every one knows, however, that men are not working harder than before the war. They are not, in many cases, working as hard. Likewise it may be recognized that economy and thrift practiced from a sense of patriotic duty were followed in the case of many by a reaction toward extravagance. Finally there is the fact that the late war was notably barren in inventions of distinct benefit economically.

With the destruction or use in war of a great deal of material, and with the loss of many workers, it is obvious that the war would be followed by a lower plane of living, not a higher, unless there were very important developments to offset. We cannot have more goods by destroying goods and we cannot have more production by killing producers. On the whole it has seemed plain that there ought to be a lower scale of living, with enforced economy, while we pay for the war.

Yet the actual experience is that a great many men have a higher scale of living, their wages having increased more than the cost of living. There must be a cause and an explanation. There are two items that will explain much of the apparent anomaly.

The first item is that there is a great deal of dwelling house construction. The total expenditures are far above the normal or average. The individual who builds or buys a home does so with the savings of a period of years. In some cases the saving has been done, part of it perhaps before the war. In other cases the saving is still to be done. The building may represent the expected savings of the next ten or fifteen years. That portion of the present "prosperity" is not permanent. It cannot perpetuate itself, when money is being spent for dwelling houses at a rate greater than the rate at which money is being saved for dwelling houses.

The second item is that the farmer is paying for a good bit of the higher living. Prof. G. F. Warren, quoted in the February issue of the Federal Reserve Bulletin, in a discussion of rural credits and the economic condition of the farmer, took the years 1909-1914 as a basis, with 100 as the relation between prices of 31 agricultural commodities and wholesale prices of commodities generally. This index was down to 75 a year ago and is now up to 80. The farmer's position is reduced by more than 20 per cent, moreover, for two reasons, because the comparison is with wholesale prices of what the farmer buys, while retail prices are proportionately higher than wholesale prices, and because in many cases the farmer must pay heavy additional transportation charges.

Thus while there is a higher plane of living for some men, there is a lower plane for the farmers, and the building of many dwelling houses represents not a permanent rate of progress, but a sudden and relatively temporary advance.

International Trade in Steel

The French occupation of the Ruhr has not resulted in any general improvement in the American export steel market, nor was there any good reason to expect that it would, although in some quarters predictions of that sort were ventured.

The vital point in all such matters is that conditions as to consumption must be considered as well as conditions as to production. The French move was likely to result in decreased iron and steel production in certain districts while it was equally likely to lessen confidence everywhere and thus to decrease consumption. If the French succeed, and heavier iron and steel production follows, there will be no surplus created, for the new condition will bring about increased consumption.

That a large export trade in steel and steel products would be advantageous to the United States may be conceded as altogether probable, but that an export trade large relative to our own

industrial operations can develop may well be doubted. We are so used to thinking in large tonnages in the United States that we sometimes fail to realize that the rest of the world works in smaller relative tonnages.

As a matter of fact, the proportions have changed since the war in a manner disadvantageous to the development of an export trade of great importance to the United States, in relation to our own production and consumption. The total iron and steel exports of the United States, Great Britain, Germany, France and Belgium have been approximately as follows, in gross tons:

1912	15,030,000 tons
1913	16,188,000 tons
1920	11,467,000 tons
1921	8,700,000 tons
1922	11,250,000 tons

The years 1912 and 1913 were easily the two best pre-war years in the matter of iron and steel export trade in general. The exports of the past three years indicate that an increase merely to the rate of 1912-13 would be a large increase, yet it would not promise us a great deal, for meanwhile our productive capacity has increased by about one-half. The comparison, of course, is on the assumption that our competitive position is much the same as before the war. It would be rash to hope or expect that conditions in the world outside the United States could become such that it would be difficult to produce steel advantageously, but easy to buy and consume our steel.

The total exports of the five countries named make a small showing, in tonnage, compared with the tonnages produced and consumed in the United States. The 15,000,000 or 16,000,000-ton pre-war total was not, moreover a net export to outsiders. Some of the tonnage was movement between the countries named. The exports to non-producing countries were probably nearer 10,000,000 tons than 15,000,000 tons. It is not the way of the world for a country to become a great iron and steel consumer without becoming also an important producer. The greatest import movement in the world's history was, as a matter of fact, that of the United States itself. In time we graduated and became an exporter instead.

The world's production of pig iron, obviously the measure of its iron and steel consumption, was 78,000,000 tons in 1913, the record year. Last year production was only a trifle over 50,000,000 tons. Our own capacity is in the neighborhood of 45,000,000 tons. The quantities indicate that our concern must be chiefly as to our own domestic consumption.

Congestion of the Courts

Increase of litigation among business men in the past few years has been rapid and has resulted in congestion of courts to such an extent as to bring about virtually a denial of justice, owing to the great expense and long delays involved. A recent investigation by the New York County Lawyers' Association shows that the number of cases on court calenders in that county is now twice as large as it was three years ago, and that the number added during the past year was about 30 per cent greater than the entire number pending at the close of the year 1918. The number disposed of is about the same in each year, and the question which presents itself is what is to be done to relieve this condition.

An examination of the causes of the increased litigation shows that attempts to enforce the prohibition law have been a prominent factor, while strikes, which have caused countless delays in making deliveries of materials and manufactured products, have also had a great influence in multiplying law suits. An examination of the causes, however, does not bring the remedy, and it is not safe to predict that the causes now resulting in increased litigation will cease to do so.

The most definite and constructive movement toward improving conditions in the courts is that which favors a more general resort to arbitration. Some associations, such as the Silk Association of America and the New York Printers' Association, have for a number of years successfully arbitrated many controversies. Their experience has indeed been of value and has encouraged business men of New York to favor more general operation under the arbitration law of that State. At a recent meeting in New York attended by judges, lawyers, business men and editors, the overwhelming sentiment of the business men was in favor of arbitration, and some of the members of the legal profession approved the efforts of the advocates of arbitration, but pointed out difficulties in the way. It is not always easy to obtain arbitrators, and legal advice is often necessary. There is no expectation that arbitration will mean competition with the courts, or that lawyers will be dispensed with, but there is substantial reason for hoping that throughout the country much can be accomplished by arbitration toward quick and inexpensive settlement of disputes in which questions of fact rather than matters of law are involved.

Ultra-Special Machine Tools

Machine shop practice in large works, where quantity production is a chief factor in planning equipment, has changed a great deal in the past two or three years. The very highly special machine has been giving way to tools of a broader range capable, if need be, of fashioning other than some one particular metal part. In some cases, buyers have gone so far as to substitute general utility machines of the required type to do work for which one-purpose machines had been considered indispensable. But in most instances the tendency has been toward a compromise between the two. This often is in the new standard types that the machine tool builders have evolved out of their experience with the requirements of quantity production shops.

The change in equipment policy is indicated in the new buying. As against the strictly single-purpose machine, it appears to be regarded as actually cheaper, in jamming work through roughing operations, to use a heavy general utility lathe or other turning machine, even if in the one instance it took two lathes and two men, and in the other only one special machine and only one

man. From the investment standpoint the single-purpose machine must have its twin, for in quantity manufacturing the break-down of a piece of equipment must not be permitted to interfere with the production balance. Moreover, a change in design of product may place the special machine out of use and it has little or no value as a second-hand tool. It must be replaced, again in duplicate, involving added heavy expense.

In the extremely large plants, of course, where quantity is so large as to spread machine investment over many pieces manufactured, the one-purpose machine will continue to be used. When it does have to be scrapped, it has paid its way. But there are not many shops of the Ford magnitude.

The in-between types of machine, having none of the extreme restrictions of the special machine, nor the wide range of the general utility models, are adaptable enough to take care of any ordinary alteration in design and, within limits, of different jobs. Changes in tools and fixtures are all that it requires. If discarded the machines have a market value. These types are by no means confined to rough turning machines, but enter comprehensively into the fields of precision grinding machines, drilling machines; in fact, of all classes of machine tools.

The machine tool builders have attended very thoroughly to the needs of the big firms which use their products as the chief element in manufacturing equipment. In fact, it is largely due to the influence of the machinery people that the pendulum has begun to swing away from the one-purpose type. Their persistent scientific study of this particular phase of their market has established the best possible practice, and this they have embodied in their new classes of tools. At the same time, they have rid themselves to a great extent of the worry and trouble of designing and building special machines, orders for which they have not cared to refuse but which are always a disturbing influence in works where the usual shop order is for a lot of an established model.

Mutual Benefit Associations

The mutual benefit association in industry is receiving more and more attention from employers. The institution is an old one and in many plants has been carried on for years. But rarely has it received the amount of interest, study and active cooperation that it has at the present time. If for no other reason than that it assists in reducing the disturbing influence of worry, it is a worthwhile factor in maintaining shop morale.

Various systems have been evolved. Some limit membership to selected risks, others include everyone who wishes to join, young and old, strong and ailing. There is a difference, too, in the award of benefits, in their amounts and in the number of days which must elapse after the beginning of disability before the insurance becomes operative. But essentially they are all alike.

Excepting in the relatively few instances where owners carry the cost, every member contributes a certain sum per week or month and, in case of sickness, after the first few days, he receives so much per week, usually with a limit of 52 weeks. Under most of the systems a certain amount, intended to defray funeral expenses, is paid in case of deaths. Accidents outside of industry are usually included as accepted causes of disability.

There is some difference of opinion among owners as to how far they should go in their cooperation with the mutual benefit association. The great majority believe that it should be self-supporting, the workers themselves bearing all expenses. In a few cases, as has been stated, owners prefer to conduct the system under their own management and at their own expense. In still other plants employers and employees share the cost.

The theory of those who would have the employees carry the burden is that it is better for the self-respect of the men and women that, by the payment of a small sum at intervals, they insure themselves, just as they would insure their lives for the benefit of their dependents. The cost is always comparatively trifling. In a typical case each member of the association pays 50 cents a month, but automatically payments cease when the amount of cash in the treasury passes a certain sum, and are resumed when the amount again falls below the limit. In this particular plant, because healthy conditions of previous months had caused an accumulation of funds above the $6,000 limit, the nearly 1000 members escaped their dues for the months of December and January just past, which are included in the period of the year giving the greatest amount of sickness.

Where an employer finances the plan, the cost is not great. The weekly benefits of $10 or $12 a week commence only after the first seven or eight days of disability, and not more than one-seventh of disabling cases of sickness endure for so long as that. In either system, the intention is not to look after those who are laid up for so short a time as to cause no serious financial loss but, as in workmen's compensation, to care for those who are deprived of their earning power for a more or less protracted period and who otherwise might be in want for themselves and their families. Naturally the plant which has a good health department has a low rate of sickness.

The benefit association, which is wholly a voluntary institution, not controlled by law as is the case with workmen's compensation, is held to be the better where employees control its operations, the management having no say in the matter. On the other hand, it is sometimes argued that the benefit association is of so great a value, from a strictly business point of view, that to maintain it is profitable in dollars and cents and therefore there is no paternalism about it. In this connection the point is made that the employee-governed association never includes all of the workers, either because of unwillingness to enter into membership or because insistence is placed on the applicant's being a good health risk, while the company-controlled plan includes everyone and thus tends to weld closer together the plant organization. Apparently the type of association is determined by local conditions and not according to any definite prevailing tendency.

CORRESPONDENCE

Galvanizing Wire

To the Editor: The writer has been noting with much interest the various communications which have been appearing relative to protective coatings of zinc for steel products.

A number of different investigators have devoted considerable time during the past years endeavoring to ascertain the causes leading to failures of zinc coatings, principally on sheets and wire. These investigators all agree that the more heavily coated products withstand atmospheric corrosion better than those having lighter coatings; some of the latter being very poor indeed.

Take wire fencing, for example. Manufacturers would be very glad to put a heavy coating of zinc on this wire, but up to the present time, no satisfactory commercial method has been developed whereby a heavy coating which was flexible and malleable could be put on the wire. It is necessary, of course, that the coating be malleable and flexible, otherwise the coating would crack off in the fence fabricating machines.

Furthermore, in order to get a smooth coating on the wire, it has been necessary to pass the wires through a pressure smoothing arrangement of some kind, which not only smoothed the wire but also removed considerable of the zinc. This was true of all wire except telephone and telegraph wire. This wire, of course, is not for fabricating purposes and will not stand any forming operations. This type of wire is also very costly to manufacture because the highest grade of spelter must be used and the tonnage of wire produced per galvanizing unit is low as compared to fence and market wire.

On the other hand, fence manufacturers have been striving for years to find some method which would permit a heavily coated wire to be used for woven wire fencing. This has been possible on the larger sizes of wire (such as No. 9 gage) to a limited extent, by using long spelter pans, lever asbestos wipes and very slow speeds of travel for the wire through the molten zinc. But, as measured by the Preece or copper sulphate test, it was not possible to secure the same results commercially and economically on the smaller gages of wire.

For these reasons, it will, no doubt, be of interest to readers to know that a process has been developed (J. L. Herman, U. S. patents Nos. 1430648-49-50-51) which is now in successful commercial operation whereby it is possible to galvanize wire without wiping it and at the same time allow heavy flexible and malleable zinc coatings to be carried on fence wire, using Prime Western spelter, if desirable, and permitting about twice the tonnage to be produced per galvanizing unit as was previously possible for heavy coatings. Furthermore, short galvanizing pans may be used and the smaller gages of wire may be coated as heavily in proportion as the larger gages. Several thousand tons of this wire have been successfully produced and wire is being produced every day by this process on a commercial scale. Salt spray and atmospheric corrosion tests have shown and are showing excellent results.

As a paper containing scientific data, etc., on this process will be submitted very shortly (probably to the American Society for Testing Materials) it will be sufficient to say here that the process consists of heat-treating the galvanized coating just after it leaves the coating bath and without wiping the coating.

Yours truly,

J. L. SCHUELER,

Peoria, Ill. Metallurgist Keystone Steel & Wire Co.

Southern Metal Trades Association Meets at Memphis

At the meeting of the Southern Metal Trades Association held in Memphis, Feb. 19 and 20, addresses were made by Hon. Whiteford R. Cole, president Nashville, Chattanooga & St. Louis Railway, on "The Railroad Situation"; Dr. G. W. Dyer, Vanderbilt University, on "Government and Business"; J. M. Hallowell, on "Leaks and Kinks in the Foundry"; H. W. Anderson, on "Metallurgy of Cast Iron", and Mr. Terry of the Lufkin Foundry & Machine Co., Lufkin, Tex., on "Foundry Costs." At the annual banquet, addresses were made by Adolph Boldt, St. Louis, district secretary of the Chamber of Commerce of the United States, on "Cooperative Voice of American Business," and by John M. Dean of the Memphis Chamber of Commerce, who dwelt on the cooperative spirit in every phase of life.

The retiring president, J. H. Dore, Houston, Texas, was presented a handsome engraved silver pitcher with goblets to match.

The following officers were elected: President, J. R. Hedges, Casey-Hedges Co., Chattanooga, Tenn.; first vice-president E. F. Billington, Soule Steam Feed Works, Meridian, Miss.; treasurer, J. M. Hollowell, Spalding Foundry Co., Atlanta, Ga.; secretary, W. E. Dunn, Jr., Atlanta, Ga.

Vice-presidents: North Carolina, W. S. Pfohl, Briggs Shaffner Co., Winston Salem; South Carolina, T. H. Siddall, Sumter Machinery Co., Sumter; Georgia, Jno. S. Schofield, Schofield Iron Works, Macon; Florida, R. O. Collins, Tallahassee Iron Works, Tallahassee: Alabama, E. W. McDonald, Talladega Fdy. & Mch. Co., Talladega; Mississippi, J. A. Mosal, Mississippi Fdy. & Mch. Co., Jackson; Tennessee, T. L. LaMalta, Chickasaw Mach. & Fdy. Co., Memphis; Arkansas, F. I. Brown, Arkansas Foundry Co., Little Rock; Louisiana, Chas R. Law, DeSota Foundry & Mch. Co., Mansfield; Texas, W. C. Trout, Lufkin Foundry & Machine Co., Lufkin; Virginia, W. E. Thomas, Union Foundry Co., Danville.

Steel Plant Engineers to Discuss Oxygen and Hydrogen Production

John F. Kelly, national secretary Association of Iron and Steel Electrical Engineers, announces that for the March 17 meeting at Pittsburgh Dr. I. Levin, chairman of the oxygen and hydrogen committee of the Compressed Gas Manufacturers Association of America, will lecture on the subject of "Simultaneous Production of Oxygen and Hydrogen." One of the features to be brought out will be the description of a plant capable of generating 2,000,000 cu. ft. of gas per year, and which can be installed for approximately $60,000. This lecture is not confined to members only, but is open to anyone who is interested in this subject.

Plated Ware in 1921

Sixty-six establishments with 9535 wage earners produced in 1921 $33,944,000 worth of plated ware, according to the report of the Census Bureau. Although the wage earners numbered more than 1919, there was considerable reduction in the volume of output. The value of the products added by manufacture (value less cost of materials) was $21,535,000 or about $2,250 per wage earner against $2,500 for each of the 9492 wage earners in 1919.

Current American Shipbuilding

On Feb. 1 American shipyards were building or under contract to build for private shipowners 235 steel vessels of 302,047 gross tons, compared with 218 steel vessels of 251,858 gross tons on Jan. 1.

These figures do not include Government ships or ships building or contracted for by the United States Shipping Board.

It is estimated that iron and steel plants in the Mahoning Valley consume approximately $2,000,000 worth of paint annually in upkeep. Much of this paint is manufactured in the valley.

Germans Planning To Do Without Ruhr

Arranging for Fuel Supplies from England and Silesia and for Using Brown Coal—Eastern Outlets for Iron and Steel and Other Industries

(By Radiogram)

BERLIN, GERMANY, March 5.—Iron and steel markets are active, with a big demand for steel bars, girders and sheets. Prices are unchanged.

The French embargo on Ruhr coal and steel has not materially affected production in the unoccupied provinces. The Iron and Steel Association declares the difficulties are not insurmountable.

Imports of English coal have been increased largely, for the supply of the Coast metal industries, while East Silesian coal is diverted to corporations in South Germany and Saxony.

There is a plan under which Stinnes is to utilize the Central German brown coal at the mine heads, for electrical smelting.

Silingen reports a satisfactory market, but electrical and locomotive branches are dull. Krupp has founded the Eastern Trading Corporation with the aim of penetrating Russia and the frontier states.

German Industry Adapting Itself to Occupation

Prices Recede as Mark Rises—Market Active with Speculative Buying—Possible European Shortage of Pig Iron—Seven Steel Works Combine

BERLIN, GERMANY, Feb. 15.—The unexpected result of the Ruhr crisis is a heavy drop in foreign exchange, which has compelled the Steel Syndicate to cut prices. The dollar, which on Jan. 31 reached 48,877 marks, was today back at 19,548 marks. The Eisenwirtschaftsbund has not yet cut pig iron prices, which are as follows in marks per metric ton: Hematite, 736,300; foundry iron No. 1, 706,300; foundry No. 3, 703,300; Siegerland steel making iron, 602,400; spiegeleisen, 8 to 10 per cent, 624,500. Pig iron prices for some time past have been relatively lower than Steel Syndicate products. Coal prices were approximately doubled on Feb. 9; standard Ruhr (Foerderkohle) being raised from 68,411 to 123,356 marks, foundry coke from 104,044 to 187,597 marks, and other fuel correspondingly. The government has submitted a bill prolonging the 40 per cent coal tax, which would otherwise expire on March 31. The following prices were quoted by the Steel Syndicate Feb. 14, 1923, the third price change in the month:

	Marks Per Metric Ton
Ingots	849,000
Blooms	949,000
Billets	1,009,000
Slabs	1,040,000
Structural forms	1,173,000
Bars	1,183,000
Universal iron	1,278,000
Wire Rods	1,261,000
Sheets:	
Thick, 5 mm. and over	1,334,000
Medium, 3 to 5mm	1,498,000
Thin, 1 to 3 mm	1,722,000
Thin, under 1 mm	1,870,000

Scrap, which has been in greater demand than ever since the Ruhr occupation, brought 550,000 m. per ton on Feb. 12, but since then shows a slight decline. The recent cut in Steel Syndicate prices is not expected to last; the mark exchange rise has the same features as the temporary rises which have taken place after former particularly violent declines; and there is no known factor making for a lasting currency recovery.

European Shortage of Pig Iron Possible

The Ruhr occupation has so far had no visible effect on the metal-using finishing industries, and not much effect on the production of heavy materials. In unoccupied territory the shortage of Lorraine minette ore has merely made the market for domestic and Swedish ores more active. Even the Siegerland smelters, who generally smelt their own ore, are using foreign ores. An acute shortage of pig iron, steel, semi-finished materials and rolling mill products is, however, certain if the French embargo on transport of all Ruhr products to unoccupied Germany is continued; and in view of the shortage prevailing in England it is held that a great part of the necessary supply must come from Czecho-Slovakia, the steel trade of which until lately was badly depressed. A general European shortage of pig-iron seems to threaten.

The Lorraine smelters depend largely upon fuel from the Ruhr; but during the first month of occupation France and Belgium have only extracted 49,000 tons of coke and coal, this under great difficulties, contrasted with German deliveries before the occupation of an average 16,000 tons a day. French reports state that 40 out of the 70 Lorraine blast furnaces were under operation on Jan. 1, and 22 out of 70 on Feb. 1. The shortage in Germany will be more extreme, because for many months past Germany has been a larger importer than exporter.

More Than Half of Steel Workers in Occupied Territory

The vital question is what will happen to the Ruhr steel production. Of 754,000 persons in all Germany who are engaged in mining and smelting, 444,000 are in occupied territory and of these 328,000 are on the Ruhr; and of 1,956,000 persons engaged in the metal and machinery branches, 356,000 are in occupied territory and of these 143,000 are on the Ruhr. As the greater part of the finishing mills are in unoccupied Germany, the Ruhr district and the old occupied parts of Germany will, unless production declines, have a great surplus of pig iron and heavy iron and steel; and they cannot produce indefinitely for stock.

The Essen *Bergwerks-Zeitung* predicts that this surplus will be thrown, via western outlets, on the markets of the world. In that case, some would come indirectly into unoccupied Germany; and some would replace iron and steel sold by foreign countries to unoccupied Germany. This would merely mean a different circulation of goods; and the foreign payment balance of Germany as a whole would not be burdened by iron shortage as it will be burdened by the enforced import of British coal. France and Belgium could, of course, prevent exports from the Ruhr to foreign countries; but this would mean a complete local collapse, with unemployment and probably serious disorders; and it is doubtful whether France would care to take on her shoulders the responsibility for this.

In general it seems that Germany can pull along even under the embargo conditions. Her ability to pay for British coal is not doubted. As very little foreign trade is done in marks, the currency collapse has not

had the predicted effect of making import impossible. On the contrary, imports in the last three months of 1922 (measured in gold marks) enormously increased; although the mark between September and December fell to about one-twentieth of its former value.

Heavy Speculative Demand

Unoccupied Germany, according to an official estimate, requires yearly about 7,000,000 metric tons of iron and steel, and has a supply of only 2,000,000 tons. This fact has caused heavy buying up of iron and steel during the past week, keeping the market extraordinarily active, and has resulted, according to the trade press, in many firms and corporations piling up unnecessarily large reserves, while others are threatened with shortage. There is a shortage of manganese. *Stahl und Eisen* reports an extraordinary demand for semi-finished materials; also a big demand, home and foreign, for structural shapes, bars and thin sheets; while the heavy sheet market, which had long been dull, has revived. Wire, wire products and tubes are also active.

All corporations producing railroad permanent way material are fully occupied, as the result of big State orders, particularly for rails and ties. No attempt has been made to obtain foreign orders. Orders for rolling stock have increased, but conditions in this branch of industry are not satisfactory.

The domestic demand for machine tools has weakened, mainly because of the shortage of working capital, which has checked many intended extensions.

Wages are increasing rapidly and although still extraordinarily low in gold nevertheless manage to keep up with the depreciation in buying power, so that the "real wage" on the whole is maintained. The last official report is for December, 1922. Between April and December, the average weekly wage of a married skilled worker in the metal industries rose from 853 to 15,423 marks, of a married unskilled worker from 807 to 14,101 marks. The skilled worker's wage as compared with 1913 had risen 424.23 fold; the unskilled worker's 598.26 fold. The cost of living had risen 556 fold, so that the unskilled worker was receiving a wage with higher buying power than before the war.

New Steel Combination Under Kloeckner

The proposed fusion of the Kloeckner concern has taken place. This big combination now consists of Hasper Iron & Steel, Koenigsborn A. G., Salinen & Solbadbetrieb, Una, Georg Marien Bergwerkes, Duesseldorfer Iron & Wire Co. and the Fasson Rolling Mills. The new corporation is called Kloeckner-Werke A. G. The old shareholders will receive 1000 m. shares in the new concern for every 1000 m. in the old. The joint capital is to be raised by 25,000,000 m.

Hugo Stinnes has formed with President Castiglioni a trading company with a capital of 100,000,000 crowns for representing the joint financial interests and selling heavy iron and steel to manufacturers. The Aquila group of Frankfurt on Main has taken over and proposes to re-start the steel works in the Vienna Arsenal. This State concern was lately turned into a private corporation and the Aquila concern holds 50 per cent of the stock. Before the war the Arsenal produced guns. The present plan is to operate two open-hearth furnaces and produce semi-finished and finished materials.

New Upper Silesian Coal Syndicate

The contract of the Rhenish-Westphalian Coal Syndicate has been extended to Sept. 30. The original contract terminates April 1, 1923. A new Upper Silesian coal syndicate for the mines in the German part of that field is being organized. Statistics of coal production in German Upper Silesia have not shown any alteration lately and there has been no export. The equipment of the mines is, however, improved and increased production is expected. The scarcity of railroad rolling stock is hampering transportation. Poland is now reported to be claiming the Delbrück mines which would be a considerable loss to German industry especially as these mines are connected with large coke works.

The iron industry in that district has sufficient orders to keep the works employed for several months. There are, however, difficulties in insuring a regular supply of raw materials. The Polish Upper Silesia coal production increased to 2,086,899 tons during January compared with 1,790,206 tons during December, 1922.

Several Austrian firms including firms in the iron and steel, engineering and electrical industry, have formed a syndicate for trade with Russia. Negotiations have been entered into with the Soviet Government for a contract similar to the one concluded with German companies. The capital will be in Swiss francs, and the Soviet Government will hold one-half of the shares.

FRENCH MARKET CHAOTIC

Ruhr Coke Shipments Decline to Almost Nothing—Minette Ore Being Piled—Prices Rise

PARIS, FRANCE, Feb. 22.—The stoppage of coke shipments from the Ruhr has entirely disorganized the French iron and steel trade. On Feb. 1, 25 furnaces were in blast in Lorraine, as against 40 on Jan. 1, and in Meurthe-et-Moselle 30, as against 47. Since then more furnaces have no doubt been blown out. Blast furnaces situated in the north and in the center of France, being closer to French and British coke supplies, are in a better situation than the blast furnaces situated in the east.

From Feb. 12 to 20, French blast furnaces received 6400 tons of coke from the Ruhr.

The Société des Cokes de Hauts-Fourneaux is endeavoring to procure coke supplies from other countries: Belgium, Great Britain, Holland and Czecho-Slovakia. An agreement is about to be concluded between France and Belgium, according to which Belgium will deliver monthly to France 35,000 to 40,000 tons of coke. From Great Britain it is no longer possible to obtain substantial tonnages of coke, which is quoted at 55s., f.o.b. Coke shipments from Czecho-Slovakia were resumed on Feb. 2 and are proceeding at the rate of 1200 tons every other day.

The adjusted price of coke, which during the second fortnight of February was 150 fr. (Franco-German frontier base), up to 30 per cent of the capacity of coke consumption of the metallurgical concerns, and 200 fr. beyond that limit, will probably be increased as from March 1.

So abnormal is the present situation and so restricted the production, with practically no available supplies, that prices must be considered, when not applying to current contracts, as exceptional and, in most cases, for very small parcels.

French exports have, naturally, ceased, and France is importing from Great Britain rather large quantities of metallurgical products.

Semi-Finished Steel.—There is absolutely nothing available in basic steel. But steelworks, which are well provided with scrap, are still turning out rather large tonnages. However, the still unsettled coal miners' strike in the Loire district, where most of the works producing open-hearth steel are situated, may affect this production unfavorably.

Finished Products.—Producers decline to accept orders at predetermined prices and are even reluctant to conclude on a coke price sliding scale base. Some producers are making an effort to sell without mentioning delay of delivery, or fixing any price. The price charged would be the one in force at delivery.

In the East and in Lorraine, 640 to 680 fr. has been asked for beams and angles, without any mention as to a delay of delivery. For delivery within two months, the price quoted was 690 fr.

On the other hand, some beams in stock have been sold at 650 to 700 fr.; and 750 fr. has been asked for 50 tons of large angles to be delivered within two or three months. Prices of rolled merchant products oscillate between 650 and 750 fr.

Rods have been purchased at 700 to 720 fr.; flats at 750 fr. and heavy sheets (5 mm. and over) at 775 fr.

FEBRUARY IRON OUTPUT

Gain Last Month 2754 Tons Per Day as Compared With January

Eighteen Furnaces Blown In and Two Blown Out or Banked—Net Gain of 16

A new February record was made by the blast furnaces of the country last month. The daily rate of 106,935 tons was the largest ever recorded in February. In February, 1916, the daily rate was 106,456 tons, or the largest until that of last month. The February record is also the largest for any month since March, 1920, when the rate was 108,900 tons. The gain of 2754 tons in output per day in February over January, however, was not as large as that of January over December or December over November or 4604 tons and 4587 tons per day respectively. The net gain in furnaces blown in last month was larger, or 16 compared with only 9 in January.

Production of coke and anthracite pig iron for the 28 days in February amounted to 2,994,187 tons or 106,935 tons per day as compared with 3,229,604 tons or 104,181 tons per day in January, a 31-day month. This is a gain of 2754 tons per day for February over January.

The total number of furnaces in blast on March 1 was 278 as compared with 262 on Feb. 1. There were 18 furnaces blown in and only two furnaces shut down. The capacity of the 278 furnaces in blast the first of this month is estimated as 110,055 tons per day compared with 105,125 tons per day for the 262 furnaces active on Feb. 1. This is an increase of 4930 tons per day.

An interesting comparison is that on March 1, 1916, there were 312 furnaces in blast with a daily capacity of 107,510 tons. On March 1, this year, 278 or 34 less stacks, have a daily capacity of 110,055 tons.

The ferromanganese output last month of 21,383 tons was the largest since December, 1920.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from February, 1922, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
February, 1922	46,827	11,387	58,214
March	53,547	12,128	65,675
April	56,930	12,140	69,070
May	60,619	13,790	74,409
June	62,534	16,167	78,701
July	62,295	15,297	77,592
August	45,672	12,914	58,586
September	53,856	13,935	67,791
October	66,060	19,032	85,092
November	72,177	22,813	94,990
December	75,179	24,398	99,577
January, 1923	79,991	24,190	104,181
February	80,684	26,251	106,935

Among the furnaces blown in during February were the following: H furnace of the Lackawanna plant of the Bethlehem Steel Co. at Buffalo and the Northern furnace in New York; No. 3 Steelton furnace of the Bethlehem Steel Co. at Steelton in the lower Susquehanna Valley; B, D, G and H Edgar Thomson furnaces, and No. 1 Lucy furnace of the Carnegie Steel Co. and one Donora furnace of the American Steel & Wire Co. in the Pittsburgh district; No. 1 Johnstown furnace of the Cambria Steel Co. and No. 2 Josephine furnace in Western Pennsylvania; one furnace of the Bethlehem Steel Co. in Maryland; the Top Mill furnace of the Wheeling Steel & Iron Co. in the Wheeling district; one Hazelton and the Hannah furnace of the Republic Iron & Steel Co. and the Tod furnace of the Brier Hill Steel Co. in the Mahoning Valley; one furnace of the Colorado Fuel & Iron Co. in Colorado, and the Standard furnace of the Bon Air Coal & Iron Corporation in Tennessee.

Among the furnaces blown out or banked during February were the following: E furnace of the Bethlehem Steel Co. at Steelton in the lower Susquehanna Valley, and one furnace of the Colorado Fuel & Iron Co. in Colorado.

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for February and the three months preceding:

Pig Iron Production by Districts, Gross Tons

	Feb. (28 days)	Jan. (31 days)	Dec. (31 days)	Nov. (30 days)
New York	181,215	186,256	174,904	164,987
New Jersey	12,740	14,076	14,953	12,071
Lehigh Valley	69,877	64,457	57,892	64,889
Schuylkill Valley	84,763	85,162	79,271	71,861
Lower Susquehanna and Lebanon Valleys	36,147	40,589	37,834	38,004
Pittsburgh district	624,331	694,075	682,775	639,462
Shenango Valley	124,736	135,962	119,960	110,628
Western Penna.	148,330	152,475	153,901	127,682
Maryland, Virginia and Kentucky	84,310	76,675	83,815	70,050
Wheeling district	115,511	125,008	103,144	77,764
Mahoning Valley	325,275	345,997	343,095	321,188
Central and Northern Ohio	296,168	325,547	312,350	309,680
Southern Ohio	49,426	56,478	55,565	41,868
Illinois and Indiana	462,376	524,774	500,972	458,966
Mich., Minn., Mo., Wis. and Colo.	130,361	147,540	128,518	112,952
Alabama	227,254	232,690	218,301	209,006
Tennessee	21,367	21,843	19,648	21,275
Total	2,994,187	3,229,604	3,086,898	2,849,703

Capacities in Blast March 1

The following table shows the number of furnaces in blast March 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast Feb. 1:

Coke and Anthracite Furnaces in Blast

Location of Furnaces	Total Stacks	March 1 — In Blast	March 1 — Capacity per Day	Feb. 1 — In Blast	Feb. 1 — Capacity per Day
New York:					
Buffalo	22	16	6,170	15	6,000
Other New York	4	2	390	1	235
New Jersey	4	1	455	1	455
Pennsylvania:					
Lehigh Valley	18	6	2,365	6	2,070
Spiegel	2	1	130	1	140
Schuylkill Valley	15	9	3,025	9	2,850
Lower Susquehanna	9	3	1,010	3	1,020
Ferromanganese	1	1	70	1	55
Lebanon Valley	6	1	160	1	175
Ferromanganese	2	1	55	1	60
Pittsburgh District	55	52	23,900	46	21,715
Ferro and spiegel	4	4	550	4	670
Shenango Valley	19	10	4,455	10	4,385
Western Pennsylvania	26	15	5,790	13	5,000
Maryland	5	5	1,480	4	1,240
Ferromanganese	1	1	85	1	90
Wheeling District	15	10	4,130	9	3,800
Ohio:					
Mahoning Valley	28	26	12,000	23	11,475
Central and Northern	26	22	10,575	22	10,500
Southern	16	7	1,765	7	1,785
Illinois and Ind.	42	32	16,515	32	17,000
Mich., Wis. and Minn.	12	10	3,500	10	3,585
Colorado and Missouri	6	3	1,150	3	1,175
The South:					
Virginia	16	4	710	4	685
Kentucky	7	3	730	3	560
Alabama	40	25	8,115	25	7,700
Tenn., Ga. and Texas	16	8	775	7	700
Total	418	278	110,055	262	105,125

Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel

Production of Steel Companies—Gross Tons

	Total Production 1922	Total Production 1923	Spiegeleisen and Ferromanganese 1922 Fe-Mn	1922 Spiegel	1923 Fe-Mn	1923 Spiegel
Jan.	1,306,045	2,479,727	6,874	1,230	19,358	12,056
Feb.	1,311,170	2,259,154	3,610	4,930	21,383	3,657
Mar.	1,629,982	.....	11,600	2,095	.....	.....
Apr.	1,707,902	.....	14,998	4,211	.....	.....
May	1,879,180	.....	15,432	4,902	.....	.....
June	1,876,033	.....	18,273	4,817	.....	.....
July	1,931,138	.....	18,873	7,176	.....	.....
Aug.	1,415,832	.....	11,402	7,925	.....	.....
Sept.	1,615,696	.....	10,681	4,235	.....	.....
Oct.	2,047,873	.....	9,193	12,283	.....	.....
Nov.	2,165,295	.....	13,232	4,192	.....	.....
Dec.	2,330,545	.....	17,007	10,591	.....	.....
Total	21,216,691	.....	151,175	68,587	.....	.....

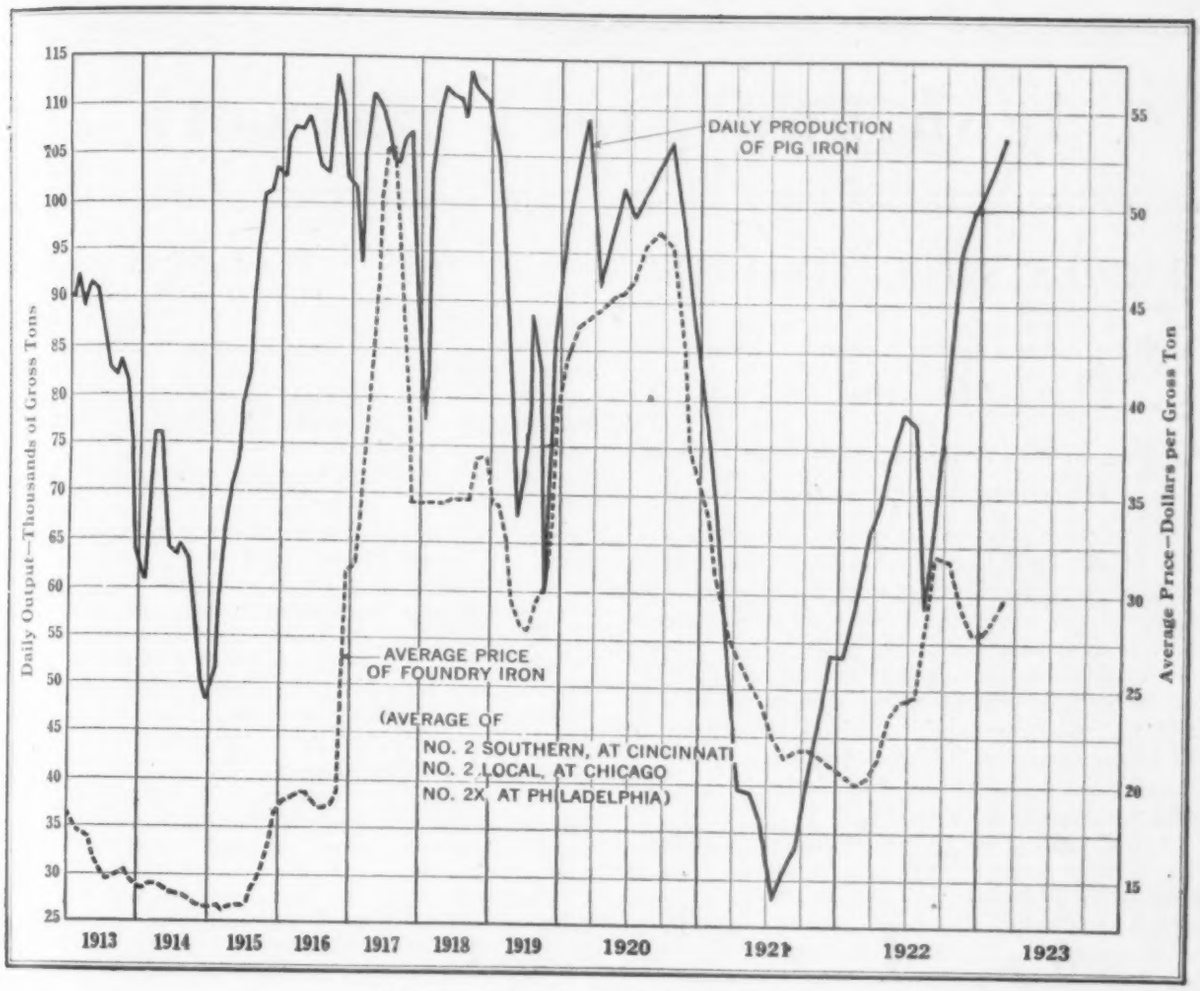
DAILY PRODUCTION OF PIG IRON
AVERAGE PRICE OF FOUNDRY IRON
(AVERAGE OF
NO. 2 SOUTHERN, AT CINCINNATI
NO. 2 LOCAL, AT CHICAGO
NO. 2X, AT PHILADELPHIA)
Daily Output—Thousands of Gross Tons
Average Price—Dollars per Gross Ton
1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923

Diagram of Pig Iron Production and Prices

companies, as well as from merchant furnaces producing ferromanganese and spiegeleisen, show the foregoing totals of steel making iron, month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

The figures for daily average production, beginning with January, 1917, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1917—Gross Tons

	1917	1918	1919	1920	1921	1922	1923
Jan.	101,643	77,799	106,525	97,264	77,945	53,063	104,181
Feb.	94,473	82,835	105,006	102,720	69,187	58,214	106,935
Mar.	104,882	103,648	99,685	108,900	51,468	65,675	.....
Apr.	111,165	109,607	82,607	91,327	39,768	69,070	.....
May	110,238	111,175	68,002	96,312	39,394	74,409	.....
June	109,002	110,793	70,495	101,451	35,494	78,701	.....
July	107,820	110,354	78,340	98,931	27,889	77,592	.....
Aug.	104,772	109,341	88,496	101,529	30,780	58,586	.....
Sept.	104,465	113,942	82,932	104,310	32,850	67,791	.....
Oct.	106,550	112,482	60,115	106,212	40,215	85,092	.....
Nov.	106,859	111,802	79,745	97,830	47,183	94,990	.....
Dec.	92,997	110,762	84,944	87,222	53,196	99,577	.....
Year	104,619	105,496	83,789	99,492	45,325	73,645	.....

Diagram of Pig Iron Production and Prices

The fluctuations in pig iron production from 1913 to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of the daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2 foundry pig iron at Cincinnati, local No. 2 foundry iron at furnaces in Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1919—Gross Tons

	1919	1920	1921	1922	1923
Jan.	3,302,260	3,015,181	2,416,292	1,644,951	3,229,604
Feb.	2,940,168	2,978,879	1,937,257	1,629,991	2,994,187
Mar.	3,090,243	3,375,907	1,595,522	2,035,920	.....
Apr.	2,478,218	2,739,797	1,193,041	2,072,114	.....
May	2,108,056	2,985,682	1,221,221	2,306,679	.....
June	2,114,863	3,043,540	1,064,833	2,361,028	.....
½ year.	16,033,808	18,138,986	9,428,166	12,050,683	.....
July	2,428,541	3,067,043	864,555	2,405,365	.....
Aug.	2,743,388	3,147,402	954,193	1,816,170	.....
Sept.	2,487,965	3,129,323	985,529	2,033,720	.....
Oct.	1,863,558	3,292,597	1,246,676	2,637,844	.....
Nov.	2,392,350	2,934,908	1,415,481	2,849,703	.....
Dec.	2,633,268	2,703,855	1,469,086	3,086,898	.....
Ttl. yr.	*30,582,878	36,414,114	16,543,686	26,880,383	.....

*These totals do not include charcoal pig iron. The 1921 production of this iron was 94,730 tons.

Of the 18 furnaces blown in during February, 6 were Steel Corporation units, 9 were independent steel company furnaces and 3 were merchant furnaces. The 2 furnaces blown out or banked in February were independent steel company stacks.

The Genesee furnace, owned by the McKinney Steel Co., Cleveland, and located near Rochester, N. Y., will resume operations in April.

For the exhibit of its combination bench lathe, milling and drilling machine, the Triplex Machine Tool Corporation, New York, received the gold medal of highest award at the International Exposition of Inventions, held in New York, Feb. 16 to 23.

Iron and Steel Markets

PRICES STILL ADVANCE

Swelling Demand Against Limit of Production

Pig Iron at 40,170,000 Rate—Ruhr Invasion Disturbing European Markets

Advancing prices feature the pig iron, semi-finished and finished steel markets. A swelling demand is being measured against the practical limit of production,—one remarkably high, even were there no labor, fuel or railroad obstacles to operation.

Expansion in automobile production and in building work is approaching the barrier of material scarcity. High prices are given as the reason for the postponement of a 16,000-ton hotel project in Chicago, but inability to get deliveries is the chief difficulty in most cases of the kind.

Other than primary producers are numbered among those withdrawing from the market pending a reduction of obligations and the return of more normal conditions. The long continued pressure of buying in the Central West, extending to the East, has unmistakably accelerated price advances.

Pig iron production last month was the highest on record for a February. The total was 2,994,187 tons, or 106,935 tons a day against 3,229,604 tons in January, or 104,181 tons a day. The output is the highest since March, 1920, when the daily make averaged 108,900 tons.

Eighteen furnaces went in and two were blown out in the month, making a net gain of 16. On March 1, the 278 furnaces were operating at a 110,055 tons per day rate, equivalent to 40,170,000 tons per annum or over 89 per cent of capacity. Of the 2754 tons daily gain in February over January, 2061 tons came from merchant furnaces.

In pig iron, prices are still advancing. Southern iron has advanced $1 to $26. At Pittsburgh, foundry grades have been marked up $2 and steel making grades 50c. to $1.50. Quotations are also higher in the East and at Buffalo. At Chicago, Virginia iron has appeared for the first time in several years and an inquiry for a considerable tonnage of Northern iron has come from Detroit, owing to a furnace in that district being put out of operation by an accident.

In semi-finished steel, an order of upward of 50,000 tons of billets, sheet bars and slabs has been put through at $45 for April and at what may be THE IRON AGE averages for May and June. This transaction represents a $5 a ton advance, as substantially no sales have occurred since the nominal $40 quotation of a week ago.

Bars, plates and shapes are now difficult to get at a 2.35c. Pittsburgh base. What of the current demand is satisfied averages close to 2.50c.

Bolts and nuts have advanced 10 per cent, though consumers and distributers generally had previously covered for the second quarter. Some makers of rivets are asking $5 a ton more for second quarter bookings. Track bolts have joined the march in prices.

A leading maker of pipe will accept oil and line pipe orders only on a basis of prices in effect at the time of shipment.

Farm machinery makers, now operating close to a 70 per cent basis, the best since 1920, are seeking third quarter protection.

Barbed wire orders are voluminous as the season draws near.

Business with the warehouses is naturally very heavy and the expected advance, owing to the higher mill prices, amounted to $3 per ton in the heavy tonnage products and commonly $2 to $5 in sheets.

Shipping of pig iron into the Chicago territory by the Steel Corporation accounts for the notable blast furnace activity in the Pittsburgh district and indicates that difficulties in shipping fuel were a cause. The Carnegie Steel Co. now has no less than 50 of its 59 furnaces making iron.

In the face of threatened delays in delivery of building steel, new fabricated steel inquiries totaling 27,000 tons appeared. Awards called for 15,000 tons.

Railroad equipment business included the purchase of 437 locomotives and 5000 cars, with fresh inquiries for 12,500 cars and 41 locomotives.

The Ruhr invasion is now disturbing the European market broadly. Germany is attempting to operate independently of the Ruhr basin, importing coal for coast plants, utilizing Silesian coal for southern plants and resorting to electric smelting. Inquiries for large tonnages of coal for both France and Germany have reached the United States, and contracts for high-grade coking coal have been made for about 100,000 tons. In Alsace and Lorraine 40 furnaces are now active out of 147. Luxemburg is approaching complete cessation of production. British prices have advanced stiffly, the average on many items being $1.18 per ton since last week.

Old material prices have advanced rapidly in nearly all centers, and at Philadelphia a sale of 30,000 tons of heavy melting steel was made at $24, which was $2 higher than recent quotations.

Pittsburgh

Sellers Try to Stop Speculative Buying—Price Trend Still Upward

PITTSBURGH, March 6.—Steel business is in smaller volume than recently, but this development is accounted for entirely by the fact that manufacturers, already heavily committed and sensing in the current demand much of a speculative character, are safeguarding themselves by declining tonnages which they are satisfied do not represent legitimate requirements. As is common in markets like the present one, buyers are attempting to place the same tonnage with several makers in the thought that by so doing they assure themselves of supplies and can cancel unfilled orders in case the market goes against them. With this thought in mind, several makers of pipe have announced that future business in oil country and line pipe would be accepted only on a basis in effect at time of shipment. In a number of other products, order books

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Mar. 6, 1923	Feb. 27, 1923	Feb. 6, 1923	Mar. 7, 1922
No. 2X, Philadelphia‡	**$31.14**	$30.76	$29.76	$21.26
No. 2, Valley furnace†	**30.00**	28.00	27.00	19.00
No. 2, Southern, Cin'ti†	**30.05**	29.05	28.05	19.50
No. 2, Birmingham, Ala.†	**26.00**	25.00	24.00	15.00
No. 2 foundry, Chicago*	**30.00**	30.00	29.50	20.00
Basic, del'd, eastern Pa.	28.50	28.50	28.00	19.84
Basic, Valley furnace	**28.50**	27.00	25.50	17.75
Valley Bessemer, del. P'gh	**30.77**	30.27	29.52	21.46
Malleable, Chicago*	30.00	30.00	29.50	20.00
Malleable, Valley	**30.00**	28.50	27.00	19.00
Gray forge, Pittsburgh	**31.27**	29.27	28.27	20.71
L. S. charcoal, Chicago	34.65	34.65	33.15	26.00
Ferromanganese, furnace	**110.00**	107.50	107.50	62.50

Rails, Billets, etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$43.00	$43.00	$43.00	$40.00
Bess. billets, Pittsburgh	**42.50**	40.00	38.50	28.00
O.-h. billets, Pittsburgh	**42.50**	40.00	38.50	28.00
O.-h. sheet bars, P'gh	**42.50**	40.00	39.50	29.00
Forging billets, base, P'gh	**50.00**	47.50	45.00	32.00
O.-h. billets, Phila.	47.67	47.67	45.17	33.74
Wire rods, Pittsburgh	50.00	50.00	47.50	36.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	2.25	2.25	2.10	1.40
Light rails at mill	2.15	2.15	2.15	1.40

Finished Iron and Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.575	2.575	2.475	1.71
Iron bars, Chicago	2.50	2.50	2.35	1.55
Steel bars, Pittsburgh	**2.35**	2.25	2.15	1.35
Steel bars, Chicago	2.30	2.30	2.10	1.50
Steel bars, New York	**2.69**	2.59	2.44	1.73
Tank plates, Pittsburgh	**2.35**	2.25	2.20	1.35
Tank plates, Chicago	2.50	2.50	2.30	1.50
Tank plates, New York	**2.69**	2.59	2.54	1.73
Beams, Pittsburgh	**2.35**	2.25	2.15	1.35
Beams, Chicago	2.40	2.40	2.20	1.50
Beams, New York	**2.69**	2.59	2.49	1.73
Steel hoops, Pittsburgh	**3.05**	2.90	2.75	1.80

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire, *Per Lb. to Large Buyers:*	Mar. 6, 1923 Cents	Feb. 27, 1923 Cents	Feb. 6, 1923 Cents	Mar. 7, 1922 Cents
Sheets, black, No. 28, P'gh	**3.50**	3.50	3.35	3.00
Sheets, galv., No. 28, P'gh	**4.60**	4.60	4.35	4.00
Sheets, blue an'l'd, 9 & 10	**2.65**	2.65	2.60	2.25
Wire nails, Pittsburgh	2.80	2.80	2.70	2.40
Plain wire, Pittsburgh	**2.65**	2.65	2.55	2.25
Barbed wire, galv., P'gh	3.45	3.45	3.35	3.05
Tin plate, 100-lb. box, P'gh	$4.95	$4.95	$4.75	$4.60

Old Material, Per Gross Ton:				
Carwheels, Chicago	**$28.00**	$27.50	$27.00	$15.50
Carwheels, Philadelphia	**26.00**	25.00	24.00	16.00
Heavy steel scrap, P'gh	24.00	24.00	22.50	15.00
Heavy steel scrap, Phila.	**24.00**	22.00	20.00	12.00
Heavy steel scrap, Ch'go	**22.50**	22.00	19.75	11.75
No. 1 cast, Pittsburgh	25.00	25.00	24.00	15.75
No. 1 cast, Philadelphia	**27.00**	25.00	24.00	17.00
No. 1 cast, Ch'go (net ton)	**25.50**	24.50	23.00	13.75
No. 1 RR. wrot., Phila.	**26.00**	25.00	24.00	15.00
No. 1 RR. wrot., Ch'go (net)	**20.50**	19.50	18.00	11.25

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$7.00	$7.00	$7.50	$3.25
Foundry coke, prompt	**8.25**	8.00	8.50	4.25

Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	**17.25**	16.87½	15.12½	13.00
Electrolytic copper, refinery	**16.75**	16.50	14.75	12.75
Zinc, St. Louis	**7.90**	7.60	7.05	4.62½
Zinc, New York	**8.25**	7.95	7.40	4.97½
Lead, St. Louis	**8.45**	8.25	8.10	4.40
Lead, New York	**8.62½**	8.25	8.10	4.70
Tin (Straits) New York	**47.37½**	45.00	40.12½	29.00
Antimony (Asiatic) N. Y.	**8.75**	7.37½	7.12½	4.20

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price, March 6, 1923, Finished Steel, 2.674 Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets

These products constitute 88 per cent of the United States output of finished steel

Feb. 27, 1923,	2.631c.
Feb. 6, 1923,	2.560c.
Mar. 7, 1922,	1.998c.
10-year pre-war average,	1.689c.

Composite Price, March 6, 1923, Pig Iron, $28.77 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

Feb. 27, 1923,	$27.79
Feb. 6, 1923,	26.63
Mar. 7, 1922,	18.25
10-year pre-war average,	15.72

are consulted upon the appearance of every new inquiry, and if the buyer already is on the books, only a tonnage equal to that which has been shipped is being accepted. This is the policy particularly of makers of wire products. It is becoming extremely difficult for buyers to interest makers of sheet and tin plate in business for the second quarter, and since all indications point to further increases in costs, none is willing to consider third or fourth quarter business.

Prices continue to grow firmer and on early tonnages of plates, shapes and bars the market now is well established at 2.35c., Pittsburgh, as a minimum, although the Steel Corporation base on these products remains at 2.25c. base, Pittsburgh. Definitely higher prices have appeared in bolts, nuts and rivets, and a further revision in spike prices has put the market flatly at last week's maximum figure. Hot-rolled flats have advanced $3 a ton since a week ago, and most makers of cold-rolled strips have gone to 5c. base, Pittsburgh.

The scarcity of semi-finished steel is as pronounced as ever, and those who have to have early supplies find it necessary to bid high to secure them. We note one sale of a round lot of billets and slabs for April delivery at close to $48, delivered, this district. The Steel Corporation is in the market for a large tonnage of slabs, and some liberal orders for skelp are going begging because of the scarcity of offerings.

The pig iron market has caught the stride of the steel market and in one week has advanced $2 a ton on foundry grades, and from 50c. to $1.50 on steel-making grades. It is doubtful whether there were ever before as many blast furnaces active in this and nearby districts as at the present time, the Carnegie Steel Co. having 50 of its 59 furnaces now making iron, with three others under orders to resume. One reason for this activity on the part of the corporation is that it is shipping pig iron from nearby furnaces to Chicago to make good in part the deficiency in that district due to the shortage of coke. Pig iron costs are rising in this district because producers have been unable to force lower prices on coke; on the contrary, several second quarter contracts have been closed in the past week at $7.25 per net ton at oven, an advance of 25c. per ton. Connellsville producers in the past two weeks have closed contracts for the second quarter which called for approximately 300,000 tons a month.

Pig Iron.—Prices have advanced easily and with considerable rapidity in the past week, particularly on foundry grades, because it has been uncovered that in face of heavy production, available supplies are not large. Steel company competition with merchant producers no longer amounts to much and the latter being obliged to pay stiff prices for coke and figuring on higher ore prices have named prices consonant with costs. Resistance to the advance on the part of melt-

ers has been weakened by the desire to be covered before prices advance further. There was one sale involving about 5000 tons of foundry grade, largely at $28.50, Valley furnace for No. 2. Then came several small sales at $29 and a sale of more than 5000 tons for a local melter. None of this grade is now available at less than $30, and most makers now are quoting No. 2X at $31 and No. 1 at $32, thus increasing the silicon differentials from 50c. to $1 a ton. Malleable iron also has reached $30 at Valley furnaces. Steel making irons are somewhat laggard in demand and prices, but this is true more of Bessemer than basic, as there was one sale of the latter at $28.50, an advance of $1.50 over last week's prevailing figure. We note one sale of 500 tons of Bessemer at $28.50, Valley furnace, but since then sales have been made at $29 and the common asking price now is $30. The Carnegie Steel Co. today blew in its Sharon furnace and now has 50 active furnaces, and it expects to have its Edith furnace in Pittsburgh and the second Bellaire, Ohio, furnace going by the end of this week. Weirton Steel Co. will light its furnace about the middle of April and the Stewart Furnace, Sharon, Pa., will be blown in May 1.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.77 per gross ton:

Basic	$28.50 to $29.00
Bessemer	29.00 to 30.00
Gray forge	29.50
No. 2 foundry	30.00
No. 3 foundry	29.50
Malleable	30.00
Low phosphorus, copper free	35.00 to 36.00

Ferroalloys.—American makers of ferromanganese have advanced prices $2.50 a ton to $110 per gross ton, furnace, for 80 per cent material, or, as it applies to this district, are quoting $114.79, furnace, freight allowed, thus naming the same delivered price as prevails on imported material. A fair amount of business is being done at $114.79, delivered Pittsburgh common freight points in both domestic and foreign alloy, although little of the latter now is available for delivery prior to July. England is said to be suffering a serious shortage of coal, and for that reason ferromanganese producers are likely to fall behind in their deliveries. An advance in British material, this time of $5 a ton, is an early probability in the opinion of some here. Jackson County furnaces advanced prices of Bessemer ferrosilicon $1 per ton.

We quote British 80 per cent ferromanganese $110, c.i.f. Atlantic seaboard, duty paid, changes in the duty for buyers account, or $114.79 delivered Pittsburgh; domestic, $114.79 f.o.b. furnace, freight allowed; 50 per cent ferrosilicon, $87.50 to $90; spiegeleisen, 19 to 21 per cent, carloads, $35 to $37, furnace; 16 to 19 per cent, carloads, $34 to $36, furnace. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, $46.50; 11 per cent, $49.80; 12 per cent, $53.10; 13 per cent, $57.10; 14 per cent, $62.10; silvery iron, 6 per cent, $35; 7 per cent, $36; 8 per cent, $37.50; 9 per cent, $39.50; 10 per cent, $41.50; 11 per cent, $44.80; 12 per cent, $48.10. The present freight rate from Jackson and New Straitsville into the Pittsburgh district is $3.66 per gross ton.

Semi-Finished Steel.—Prices still are very indefinite, since producers are unable to entertain current inquiries and actual business remains very limited on account of that fact. It is apparent, however, that $42.50, Pittsburgh or Youngstown, is the minimum price idea of makers on billets, sheet bars and slabs, and there is much doubt whether those who had to have tonnages promptly could secure them even that low. No prices yet have come out on second quarter contracts, but the common impression is that they will not be below $42.50. A Pittsburgh district sheet maker has secured an option on his second quarter sheet bar requirements, but the price has not yet been settled. Several round tonnages of billets, sheet bars and slabs are understood to have been taken by an outside mill for second quarter delivery at $45 mill, for April tonnages, while the price for the last two months of the period are to be settled on IRON AGE averages. On forging billets and blooms, $50, Pittsburgh, or Youngstown, and in some cases f.o.b. mill, is as low as any makers are willing to take business. There is a marked shortage of skelp and it is said that 100,000 tons of small pipe and boiler tube skelp could readily be disposed of right here in this district. This material is quotable from 2.25c. to 2.50c., but on light, narrow stock, some mills sell on the plate card with the plate extras for gage and width, while others rolling it on hoop and hand mills are asking close to the hoop and band base. Wire rods are hard to find, as most makers are sold up for the next few months and not anxious for additional bookings. The Steel Corporation base is $47 for No. 5 and ¼-in., but it is not taking new business; independents will not consider less than $50. The Steel Corporation is in the market for a large tonnage of slabs. Prices are given on page 713.

Iron and Steel Bars.—While the Steel Corporation and the leading independent here still are quoting soft steel bars at 2.25c., base, Pittsburgh, neither is taking prompt delivery business at that figure and the specified delivery market is more properly quotable at the prices of those in a position to make such deliveries and these mills are naming anywhere from 2.35c. to 2.50c., Pittsburgh, and in some cases, 2.50c. f.o.b. mill. Mills are not anxious for deferred delivery business, because it is feared further increases in costs are immediately ahead in the shape of wage advances and it is also sensed that efforts of buyers to get a place on mill books are partly speculative and are made with the idea that if prices later go down, they can cancel. Iron bars have advanced $3 per ton to 2.90c., base, for refined iron in carload lots.

We quote steel bars rolled from billets at 2.25c. to 2.50c. reinforcing bars, rolled from billets, 2.25c. to 2.50c. base; rail steel reinforcing bars, 2.20c. to 2.30c.; refined iron bars, 2.90c. in carloads, f.o.b. mill, Pittsburgh.

Wire Products.—Pressure for supplies still is heavy and the problem of manufacturers is to keep all consumers and distributers satisfied. It is believed, however, that buyers have anticipated their requirements to a large extent and some let up in the demand is looked for in the near future. Producers are practically sold out against production over the next three months and new bookings are being restricted to regular customers and then only to the extent of completed tonnages. There has been no move on the part of the leading interest to revise its prices further, nor among independents to change from their schedules. A uniform price level is improbable until obligations are reduced and competitive conditions in business again prevail. Prices are given on page 713.

Steel Rails.—Business in light rails suffers from the fact that coal operators, unable to secure sufficient supplies of cars, are running on part time schedules, and do not require many rails. Light rails rolled from billets still range from 2.15c. to 2.25c., base, mill, but there being more sellers than buyers, most of the business is at the lower figure. Rails have not not yet been able to catch the stride of the general market and are considered too low by comparison.

We quote 25 to 45-lb. sections, rolled from new steel, 2.15c. to 2.25c. base; rolled from old rails, 2c. to 2.10c. base; standard rails, $43 per gross ton mill for Bessemer and open-hearth sections.

Sheets.—There is no let up in the demand, but actual business is restricted by the fact that most producers have comfortable order books and are not free sellers. Production is on a large scale and shipments are reasonably free for the season of the year, but there are a number of consumers who are not getting as much steel as they require and find it necessary to pay more than the regular market prices to secure early tonnages. Non-integrated producers will probably have to advance prices still further since sheet bars for second quarter are likely to command at least $42.50, a clear advance of $6 a ton over first quarter prices. Sheet prices are given on page 713.

Tubular Goods.—Demand is still on an enormous scale with most makers of steel pipe already committed for at least three months. All makers are scrutinizing orders for standard pipe with considerable care and are accepting business strictly on the basis of average allotments, or are taking new orders only to the extent of completed tonnages. The leading interest and several of the independent companies are accepting business in oil country and line pipe only on a basis of prices in effect at time of shipment. The Pan-American Petroleum Co. is in the market

for 160 miles of 9-in. line pipe with the alternative proposition of taking either 8- or 10-in. The position of makers of wrought iron pipe also is tight with regard to additional orders, and in boiler tubes distribution of production is entirely on an allotment basis.

Cold-Finished Steel Bars and Shafting.—While some makers are having no trouble in securing orders at the new base of 2.80c., Pittsburgh, for carloads, and one reports sales in the past few days of 2000 tons at that figure, others have found that buyers do not respond particularly well to the new figure. This may be partly explained by the fact that some producers allotted a longer period than others for buyers to enter business at the former base of 2.65c. The bulk of the demand is for the small sizes, large bars not being much wanted. Ground shafting is quoted at 3.20c., base, fo.b. mill, for carload lots.

Structural Material.—There has been no change in the price of the Steel Corporation, which still is 2.25c., Pittsburgh, but it cannot take business for early delivery and the early shipment market appears quotable at 2.35c., Pittsburgh, minimum, one independent naming that figure on large beams for delivery in 60 days. Cambria Steel Co. is quoting 2.50c., mill, on large structural shapes for early delivery. Structural awards still are few and small in this district, but the shops here are well filled up and note no dearth of inquiries.

Plates.—The Steel Corporation has made no change in its price, still quoting 2.25c., base, Pittsburgh, but already is fully committed for the current half year and unable to make deliveries before July 1, on new orders. The lowest price now quoted here on reasonably early shipments is 2.35c., base, while some makers are asking 2.50c., mill. The latter price is being named by one maker with the definite idea of discouraging purchases, as this producer already is heavily booked. Hillman Coal & Coke Co. recently placed orders for 300 65-ton cars with the Standard Steel Car Co., and an equal number of 70-ton cars with the Pressed Steel Car Co. About 7500 tons of steel, exclusive of trucks and wheels, will be required and as rolled steel wheels are specified, there will be a considerable addition to the tonnage in the order. The Riter-Conley Co., Pittsburgh, is low bidder for three steel barges for the Government. Plate prices are given on page 713.

Hot-Rolled Flats.—Leading independent producers have advanced the price $3 per ton to 3.05c., base, Pittsburgh, for the ordinary gages and widths and to 3.40c. to 3.60c. for stock narrower than 1 in. and No. 16 gage and lighter. The Steel Corporation has announced no change in price, but is believed to be observing the new figure. All makers are heavily sold up and several have withdrawn from the market, pending some definite light on steel costs for the second quarter. Prices are given on page 713.

Cold-Rolled Strips.—We now quote this product at 5c. to 5.25c., base, Pittsburgh, for while the established price for the second quarter was 4.75c., none of the mills will take additional business at that price and guarantee delivery. For specified deliveries, 5c., base, is minimum.

Warehouse Business.—Effective March 1, warehouse prices on bars, shapes, hoops and bands were advanced $3 per ton. New prices are 3c., base, for bars, 3.10c. base, on shapes, 3.80c., base, on bands and 4.90c., base, on hoops.

Bolts, Nuts and Rivets.—Effective Feb. 28, leading makers in this district advanced bolt and nut prices on an average about 10 per cent and this change has been adopted by Cleveland manufacturers. The new base is 50 per cent off list for large machine bolts, and on nuts $3.25 off list for blank and $3 off list for tapped. New prices find no basis in sales since consumers and distributers were allowed to enter orders for their second quarter requirements prior to the advance. Some makers of rivets have advanced prices $5 a ton to $3.25 base for 100-lb. for large structural and ship rivets, and the usual advance for boiler rivets, and to 60 and 5 per cent off list for small rivets. One large maker in the district, however, has not yet opened its books for second quarter business and is quoting $3.25 to $3.50 for large structural rivets and $3.35 to $3.60 on large boiler rivets, and from 65 to 60 and 5 per cent off list for small rivets on current business. The chief reason for the advance is found in the strength in steel. Prices and discounts are given on page 713.

Track Fastenings.—Track bolts have joined in the advance in spikes and are now quoted here at $4 to $4.50 base per 100 lb. for ¾-in. and larger and $5 to $5.50, base, on ⅝-in. and smaller, for carload lots. These prices compare with a former range of $3.85 to $4.50, the explanation for the relatively steep advance being that former prices were too low. The Jones & Laughlin Steel Corporation has further advanced spike prices and all makers in this district now are on a basis of $3.15 base per 100 lb. on large spikes, $3.75 base for small ones and $3.50 for boat and barge spikes. The new prices have as yet found little basis in sales. Prices are given on page 713.

Coke and Coal.—Coke prices have developed further strength since a week ago, due to the fact that blast furnace interests, after thoroughly testing the market, fail to weaken the ideas of producers and have closed second quarter contracts at or about producers' prices. In the past week, second quarter contracts for about 100,000 tons a month have been closed at prices ranging from $7 to $7.25 per net ton oven. Previous business, mostly at $7 at ovens, calls for an aggregate of 200,000 tons a month. Spot tonnages of furnace coke are also commanding $7 to $7.25. With so much furnace business already booked, offerings of foundry grade have shortened and the lowest price now quoted is $8.25, and from that up to $9 is being paid. The coal market is not quotably higher, but is stronger to the extent that prices now find basis in sales. We quote steam coal, mine run grade, $2 to $3 per net ton at mines and mine run coking and gas coal from $3 to $3.50 at mine, one reason for the improvement being the appearance of export business.

Old Material.—Activity is lacking, but there is such a scarcity of supply that prices do not grow any weaker. Sellers' ideas are considerably higher than those of the mills and the belief that with open weather supplies will increase also makes melters hesitate. A West Virginia sheet manufacturer recently bought about 5000 tons of selected heavy melting steel lying in a local yard and is said to have paid $25.50, Pittsburgh, or about $27.39 delivered, but this sale is hardly representative because of the privilege of selection and it is also reported that the transaction is tied up with a sale of basic pig iron at a relatively low price. High prices were paid against the Pennsylvania Railroad, Central Region, list, cupola cast scrap fetching $26.90 per gross ton delivered; turnings, $22.12; heavy breakable cast, $24.10; knuckles and couplers, $27.50; heavy melting steel, $26.30, and steel rails, $24.64. There is an acute shortage of low phosphorus stock and machine shop turnings, with the latter now commanding more than shoveling turnings or mixed borings and turnings. The Baltimore & Ohio will receive bids until noon, March 10, on 19 carloads and 18,610 gross tons of old material.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Per Gross Ton	
Heavy melting steel	$24.00 to $24.50
No. 1 cast, cupola size	25.00 to 25.50
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va.; and Franklin, Pa.	24.00 to 24.50
Compressed sheet steel	22.50 to 23.00
Bundled sheet sides and ends	21.00 to 21.50
Railroad knuckles and couplers	26.00 to 26.50
Railroad coil and leaf springs	26.00 to 26.50
Low prosphorus standard bloom and billet ends	30.00 to 30.50
Low phosphorus, plates and other grades	29.00 to 29.50
Railroad malleable	26.00 to 26.50
Locomotive axles, steel	27.00 to 28.00
Steel car axles	26.00 to 26.50
Cast iron wheels	25.00 to 25.50
Rolled steel wheels	26.00 to 26.50
Machine shop turnings	20.00 to 20.50
Heavy steel axle turnings	22.00 to 23.00
Short shoveling turnings	19.00 to 19.50
Cast iron borings	20.50 to 21.00
Heavy breakable cast	22.00 to 22.50
Stove plate	18.00 to 18.50
Sheet bar crop ends	26.00 to 26.50
No. 1 railroad wrought	21.00 to 22.00

Chicago

Buying Insistent Despite Price Advances—One Large Project Postponed

CHICAGO, March 6.—Advancing prices have not checked buying; on the contrary, demand for steel is more insistent than ever. As their business increases, consumers seek more tonnage, but with order books heavily loaded, mills are having difficulty in satisfying these expanding wants. Local producers are unable to take additional tonnage for first half delivery and are having difficulty shipping what is now on their books owing to continued fuel scarcity. A number of important mills east of here are out of the market pending the establishment of prices to govern second quarter business. It is apparent that consumption continues to grow while steel output has reached the maximum rate which can be hoped for, for some time to come.

Automobile production, particularly, is increasing rapidly, the manufacturing records of a number of large companies having been broken. Farm machinery makers, at a 70 per cent rate, are operating at the best rate in three years. The first important indication of an unfavorable reaction to price advances was the indefinite postponement of the construction of the Stevens Hotel, Chicago, a project involving 16,000 tons of fabricated steel. Railroad car buying has fallen off, but with transportation service growing worse rather than better, a resumption of equipment purchases on a broad scale appears imperative.

Local mill operations are unchanged, being limited by deliveries of coking coal. No immediate relief in this direction is in sight, although it is hoped that heavier shipments will be possible with the resumption of navigation on the Great Lakes.

Pig Iron.—Demand is active and prices are steadily growing stronger. The Southern furnace which has been selling iron for shipment by water and rail is sold up for second quarter and has withdrawn from the market. All-rail material has advanced to a minimum of $26 base, Birmingham, and a number of important producers are out of the market entirely. Chicago iron is strong at $30 to $31 base furnace, with the likelihood that it will soon advance to minimum of $31. The leading Northern merchant reports that February, a short month, showed heavier shipments than January and that so much business has been booked that an additional furnace will have to be blown in at an early date. Demand for spot iron is particularly heavy, both because of delays to shipments from outside producing centers and an accident which recently put a Detroit furnace out of service. The latter development has released a flood of inquiries from Michigan, one of them alone calling for 4000 tons of foundry. Sales have been numerous. A northern Illinois melter has closed for 1000 tons of Northern foundry for second quarter. A Michigan user has placed its second order for 1000 tons of Southern foundry within two weeks. A stove manufacturer in the same State has purchased 1000 tons of foundry for second quarter shipment and a third Michigan melter has ordered 500 tons of Southern for second quarter and a like tonnage for third quarter, the former at $26 base and the latter at $26.50 base, Birmingham. Virginia iron is commencing to penetrate to this territory for the first time in several years. A number of fair sized sales have been made, particularly in Michigan, where the freight from furnace is about $6.50. This iron is quoted at $28 base, furnace. We note a sale of 600 tons to a Michigan user. A Wisconsin melter has purchased 200 tons of charcoal for prompt shipment at the new price of $31 base, furnace, and there have been numerous smaller sales. Silvery has advanced $1 a ton, and heavy purchases were made just prior to the change. One thousand tons was bought for second and third quarter delivery to Illinois and St. Louis district plants of the same company, 500 tons was purchased by a Michigan melter for second quarter shipment, and there were a number of other sales ranging from carloads up to 300 tons. A Michigan automobile manufacturer is inquiring for 2000 tons of silvery for May to August delivery. Reviewing the market as a whole, it is notable that inquiries are becoming more insistent, particularly for prompt shipment, as sellers grow more active because of the high price of scrap. One recent sale of off-grade material covered 500 tons.

Quotations on Northern foundry high phosphorus malleable and basic irons are f.o.b. local furnace and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards or, when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	$34.65
Northern coke, No. 1, sil. 2.25 to 2.75	$30.50 to 31.50
Northern coke, foundry No. 2, sil. 1.75 to 2.25	30.00 to 31.00
Malleable, not over 2.25 sil.	30.00 to 31.00
Basic	30.00 to 31.00
High phosphorus	30.00 to 31.00
Southern No. 2, first quarter	32.01
Low phos., sil. 1 to 2 per cent copper free	39.00
Silvery, sil. 8 per cent	42.29

Ferroalloys.—Ferromanganese is hard to obtain for prompt shipment, and a further advance to $125 seaboard is predicted.

We quote 80 per cent ferromanganese, $117.56, delivered; 50 per cent ferrosilicon, $87.50, delivered; spiegeleisen, 18 to 22 per cent, $44.58, delivered.

Plates.—Demand continues strong and with local mills committed through first half, considerable business is going to mills east of here. A number of the latter, in turn, are out of the market at present, not having announced their second quarter prices.

The mill quotation is 2.35c. to 2.50c., Chicago. Jobbers quote 3.20c. for plates out of stock.

Bars.—Demand for soft steel bars grows more pressing as the needs of users mount. Widespread revival in industrial activity is reflected in increased business on the books of manufacturing consumers, but their efforts to obtain more raw material are beset with difficulties. Local mill operations are limited by a shortage of fuel and Chicago mill books are full for the first half and beyond. A number of mills east of here are out of the market and have not yet announced their second quarter prices. Automobile production continues to expand. On March 1 the Ford Motor Co. broke all records by turning out 6000 cars. The Studebaker Corporation is now making 550 machines a day. The operations of the agricultural implement industry, at close to 70 per cent of capacity, are the best since 1920. Attractive orders for farm machinery are being received from South America and South Africa. Bar iron is firm at a minimum of 2.50c., mill, with buying in satisfactory volume. An advance to 2.30c., mill, on rail steel bars is expected in view of the steady rise in old rail prices. Rail bar mills are well booked, one of them, in fact, being out of the market for the remainder of first half.

Mill prices are: Mild steel bars, 2.25c. to 2.30c., Chicago; common bar iron, 2.50c. to 2.60c., Chicago; rail steel, 2.20c., Chicago mill.

Jobbers quote 3.10c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 4.10c. for rounds and 4.60c. for flats, squares and hexagons.

Jobbers quote hard and medium deformed steel bars at 2.75c. base; hoops, 4.45c.; bands, 3.85c.

Sheets.—The local independent has advanced its quotations to those announced by the Steel Corporation subsidiary last week, but in both cases the prices are nominal, as first half capacity is entirely committed. Consumers who have not bought their full second quarter requirements must turn to mills east of here whose prices range from 4.75c. to 5c., base, Pittsburgh, on galvanized, from 3.75c. to 3.85c. on black and from 2.75c. to 3c. on blue annealed.

Mill quotations are 3.50c. to 3.85c. for No. 28 black, 2.65c. to 3c. for No. 10 blue annealed and 4.60c. to 5c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 34c. per 100 lb.

Jobbers quote, f.o.b. Chicago, 4.15c. for blue annealed, 5c. for black and 5.85c. for galvanized.

Wire Products.—Specifications are a little lighter while the pressure for deliveries is heavier, indicating that buyers are more concerned about getting shipments than putting additional orders on mill books.

Heavier orders for barbed wire are coming in as the season for the buying of this commodity draws near. Liberal purchases of barbed wire are being made by the railroads. Demand for nails continues heavier proportionately than for other products. Although production continues at an 80 per cent rate, mills are unable to satisfy the wants of customers. For mill prices see finished iron and steel, f.o.b. Pittsburgh, page 713.

We quote warehouse prices f.o.b. Chicago: No. 6 to No. 9 bright basic wire, $3.75 per 100 lb., extra for black annealed wire, 15c. per 100 lb.; common wire nails, $3.80 per 100 lb.; cement coated nails, $3.25 per keg.

Bolts and Nuts.—Bolts have advanced 10 per cent and nuts 5 per cent on a strong market. The new discounts will be used as a basis for second quarter contracts. Prices ruling in this district are those on page 713, except that they are f.o.b. Chicago instead of f.o.b. Pittsburgh.

Jobbers quote structural rivets, 3.75c.; boiler rivets, 3.85c.; machine bolts up to ⅞ x 4 in., 50 per cent off; larger sizes, 50 off; carriage bolts up to ⅞ x 6 in., 45 off; larger sizes, 45 off; hot pressed nuts, squares and hexagons, tapped, $2.75 off; blank nuts, $2.75 off; coach or lag screws, gimlet points, square heads, 55 per cent off.

Cast Iron Pipe.—A number of attractive tonnages have been added to the heavy commitments already on the books of pipe shops. Prices range from $45 to $47, Birmingham, and higher, on 6-in. and larger, depending on the character of the specifications. Further advances are regarded as inevitable in view of the continued rise of pig iron. The United States Cast Iron Pipe & Foundry Co. will furnish 300 tons for Hinsdale, Ill., and 1550 tons for Smith Center, Kan. Fort Wayne, Ind., has awarded 500 tons to the National Cast Iron Pipe Co., and Appleton, Wis., has placed 350 tons with Lynchburg Foundry Co. James B. Clow & Sons are low bidders on 15,000 tons for Toledo, Ohio. Desplaines, Ill., received tenders on 618 tons of 6 to 12-in. March 5.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., $57.20 to $59.20; 6-in. and above, $53.20 to $55.20; class A and gas pipe, $3 extra.

Rails and Track Supplies.—Although it is still uncertain whether any change will be made at this time, it is intimated in some quarters that standard section rails will be advanced to $47, mill.

Standard Bessemer and open-hearth rails, $43; light rails, rolled steel, 2.15c., f.o.b. makers' mills.

Standard railroad spikes, 3.15c. mill; track bolts with square nuts, 4.15c. mill; iron tie plates, 2.75c.; steel tie plates, 2.60c., f.o.b. mill; angle bars, 2.75c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.80c. base and track bolts, 4.80c. base.

Warehouse Prices.—Recent advances in mill prices have been reflected in higher warehouse prices on plates, shapes, bars, cold rolled steel bars and shafting, hoops and bands, blue annealed and black sheets, wire and nails, and track spikes and bolts. The new quotations are carried under the appropriate paragraphs.

Billets.—A local mill ordinarily a seller of billets, is inquiring for 8000 tons of 2-in. squares. A Chicago hoop and strip mill is in the market for 10,000 tons.

Structural Material.—The Stevens Hotel, Chicago, a project involving 16,000 tons of steel, has been indefinitely postponed because contractors' bids greatly exceeded estimated costs. Other fabricating work, however, continues to go ahead, lettings for the week being liberal. A number of attractive prospective jobs have also appeared. The scarcity of plain material is growing more pronounced. Local mill prices are nominal except for indefinite delivery and a number of important producers east of Chicago have withdrawn from the market pending the announcement of second quarter quotations.

The mill quotation on plain material is 2.35c. to 2.40c., Chicago. Jobbers quote 3.20c. for plain material out of warehouse.

Reinforcing Bars.—Lettings have dropped off sharply, although a number of attractive tonnages have been added to the long list of pending jobs. However, one of the largest prospective projects, the Stevens Hotel Building, Chicago, involving 1200 tons, has been postponed for two years, because general contractors' bids exceeded the estimated cost by fully 30 per cent. Because of recent advances in mill prices, dealers expect to raise their Chicago warehouse quotations to 3c., effective March 10. Awards include:

U. B. Building, Dayton, Ohio, 550 tons to Kalman Steel Co.
United States Veterans' Hospital, Camp Custer, Battle Creek, Mich., 500 tons, to Kalman Steel Co.
State highway work in Racine and Walworth counties, Wisconsin, 200 tons to Corrugated Bar Co.
Winnebago County State highway job, 106 tons to Richard S. Hill, 425 East Water Street, Milwaukee.

Pending business includes:

Addition to Edgewater Beach Hotel, Chicago, 480 tons.
Marquette Portland Cement Co., warehouse, Chicago, 350 tons.
Garage for Paul J. Cornell Estate, Chicago, 150 tons.
Bank, Marietta, Ohio, 125 tons.

Coke.—The local producer of by-product foundry coke reports its commitments in that product as heavy as during the war. Coke shipped is used almost as fast as it is delivered because limited oven operations have dictated the allocation of output to the end that all customers might continue operations. Notwithstanding the fact that melters have been running on scant supplies for weeks and weeks, very few shut downs have been reported. Shipments of foundry coke from the local plant were heavier in February than in January and deliveries are steadily growing freer. Steady improvement is looked for from now on, both because of the passing of the demand for domestic coke and the contemplated addition of another battery of ovens. Local foundry continues to be quoted at $15 delivered Chicago switching district. There has also been a heavy sale of outside coke in this territory. Connellsville foundry is still available at as low as $8, ovens, or $12.16 delivered, while a Southern by-product can be had for $12.54 delivered. A Michigan consumer has placed an order for 5000 tons of high grade Eastern coke for second quarter at about $4 above the market on standard Connellsville. Transportation difficulties are delaying deliveries of coke from outside points.

Old Material.—Further consumptive buying of practically all grades as well as active competitive trading by dealers continues to push the price level upward. The dearth of material is steadily becoming more pronounced, the country offerings almost nil and railroad lists far too small to satisfy current demand. The available supply of prepared cast scrap, in fact, has been practically cleaned out and there is little low phosphorous steel to be found. The Chicago & Eastern Illinois and the Pere Marquette offer 800 tons each.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	$26.50 to $27.00
Cast iron car wheels	28.00 to 28.50
Relaying rails, 56 and 60 lb.	26.00 to 27.00
Relaying rails, 65 lb. and heavier	32.00 to 35.00
Rolled or forged steel car wheels	27.50 to 28.00
Rails for rolling	23.50 to 24.00
Steel rails, less than 3 ft.	25.50 to 26.00
Heavy melting steel	22.50 to 23.00
Frogs, switches and guards cut apart	22.50 to 23.00
Shoveling steel	22.00 to 22.50
Drop forge flashings	18.50 to 19.00
Hydraulic compressed sheets	19.75 to 20.25
Axle turnings	19.50 to 20.00
Per Net Ton	
Iron angles and splice bars	26.00 to 26.50
Steel angle bars	22.00 to 22.50
Iron arch bars and transoms	26.00 to 26.50
Iron car axles	29.50 to 30.00
Steel car axles	24.50 to 25.00
No. 1 busheling	19.00 to 19.50
No. 2 busheling	14.00 to 14.50
Cut forge	20.00 to 20.50
Pipes and flues	16.50 to 17.00
No. 1 railroad wrought	20.50 to 21.00
No. 2 railroad wrought	20.00 to 20.50
Steel knuckles and couplers	25.00 to 25.50
Coil springs	25.00 to 26.00
No. 1 machinery cast	25.50 to 26.00
No. 1 railroad cast	24.50 to 25.00
No. 1 agricultural cast	24.50 to 25.00
Low phos. punchings	21.50 to 22.00
Locomotive tires, smooth	22.00 to 22.50
Machine shop turnings	14.00 to 14.50
Cast borings	16.50 to 17.00
Short shoveling turnings	16.50 to 17.00
Stove plate	22.50 to 23.00
Grate bars	21.50 to 22.00
Brake shoes	21.50 to 22.00
Railroad malleable	25.50 to 26.00
Agricultural malleable	25.50 to 26.00

New York

Strong Demand for Coal from Europe—Acute Shortage in Building Steel

NEW YORK, March 6.—Owing to the situation in the Ruhr, from which both Germany and France are suffering, a strong demand has developed for American coal and coke. Many of the inquiries have come from British sources for shipment to Germany as well as France, and the ultimate destination is not always disclosed. Exaggerated reports have been current as to the extent of the tonnage involved, but it is certain that a large tonnage of Pocahontas coal, amounting to probably 100,000 tons, has been contracted for by British agents. A limited tonnage of coke has also been bought. Ocean freight rates are advancing, that from New York to Rotterdam having gone from $2.25 to about $3, and further advances are probable. Coal prices are also being marked up. High grade New River and Pocahontas coal, which was quoted at $6.15, Hampton Roads, about a week ago, is now being quoted at $6.75 to $7. Coal at the mines shows a wide variation in prices, ranging all the way from $1.55 for high volatile Fairmont steam coal to $4.50 for low volatile grades. Standard furnace coke is not less than $7 per ton ovens, and a fair range is $7 to $7.25. Foundry coke is quoted from $8.25 to $8.75. By-product is unchanged at $14.84 to $14.91, Newark and Jersey City points.

Pig Iron.—The past week has been like the preceding on account of many sales of moderate size being made, but the total probably would not exceed 15,000 tons, and no noteworthy tonnages were recorded. Prices are higher. The leading Virginia interest is quoting $28, but $27.50 can still be done. In eastern Pennsylvania $29 is the minimum, with some sales of small tonnages made considerably higher. In Buffalo iron the base price ranges from $28 to $29. A sewing machine company which recently bought a round tonnage is inquiring for 2000 tons additional. The car situation is very bad and the New York Central has 17,000 delayed cars east of New York, of which 7000 are bound to New England.

We quote delivered in the New York district as follows, having added to furnace prices $2.27 freight from eastern Pennsylvania, $4.91 from Buffalo and $5.44 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	$33.27
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	32.27
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	31.27
Buffalo, sil. 1.75 to 2.25	$32.91 to 33.91
No. 2X Virginia, sil. 2.25 to 2.75	33.44
No. 2 Virginia, sil. 1.75 to 2.25	32.44

Ferroalloys.—Moderate sales of British ferromanganese have been made at $110, seaboard. No alloy is being sold for shipment before July, and one producer has withdrawn altogether. The market, however, is not particularly active, most consumers being apparently well covered. If steel production, however, continues at its present rate much longer, substantial inquiries for prompt shipment are expected. There is considerable talk of higher prices for the British product, and this would not come as a surprise because both manganese ore and coke are high and scarce in Great Britain and the rate of steel output is rapidly increasing. The spiegeleisen market is moderately active and some sales have been made for last half delivery at unchanged prices. The market for 50 per cent ferrosilicon is gaining new strength and the minimum quotation now is $90, delivered. A scarcity of this product is predicted.

Warehouse Business.—Demand is heavy for practically all kinds of material, orders being divided between regular customers, and many who are unable to obtain sufficiently early delivery from mills. In response to the upward movement in mill quotations on all materials, warehouse prices were advanced, effective March 1, to a basis of 2.25c. per lb., Pittsburgh. The present quotations on bars, structural material and plates, out of stock, allow for a margin of about $15 per ton between the mill and warehouse price, which is slightly higher than for some time. Bars are now quoted at 3.34c. per lb. base; shapes at 3.44c. per lb. and plates at 3.44c. per lb. Tire steel is now on a basis of 3.35c. per lb.; toe-calk steel, 4.30c. per lb.; cold rolled strip steel, 7c. to 8c. per lb.; and open hearth spring steel shows a slight advance from a basis of 4c. per lb. to 4.35c. per lb. base. Blue annealed sheets are now generally quoted at 4.34c. per lb. base, and black and galvanized show a decided stiffening, the former ranging from 4.50c. to 4.90c. per lb. base, and the latter from 5.50c. to 5.90c. per lb. base. Most brass and copper products were advanced March 3 by ¼c. per lb., the fourth advance in the past fortnight. Charcoal and coke tin plates are up from 50c. to $1 per box. We quote prices on page 732.

Cast-Iron Pipe.—Buying continues active from both private and municipal sources. Pipe makers are quoting on numerous municipal tenders. A recent tender from Liberty, N. Y., for 1000 tons of 8-, 10- and 12-in. water pipe was awarded to the Warren Foundry & Pipe Co. Prices are higher by $1 per ton on water pipe. We quote per net ton f.o.b. New York, in carload lots, as follows: 6-in. and larger, $57.50; 4-in. and 5-in., $62; 3-in., $67.80, with $4 additional for Class A and gas pipe. An active demand for soil pipe from jobbers continues. We quote discounts of both Southern and Northern makers, delivered New York, as follows: 2- to 6-in. standard, 18 to 20¾ per cent off list; heavy, 28 to 30¾ per cent off list.

Finished Iron and Steel.—An acute shortage of steel for buildings, as well as for other purposes, now seems more than a possibility. One large independent fabricator has withdrawn all quotations; the largest independent manufacturer of structural shapes is quoting on only a small percentage of the jobs on which it has been asked to bid in the past week or two, and the leading interest is so well sold up that it can offer no promise of definite delivery in less than six months. A good many projects which were planned for spring erection may be indefinitely postponed because of the inability of mills and fabricators to promise early enough shipments of steel. The factor of costs, though being seriously regarded by many prospective builders, does not seem of so much importance as that of delivery. Mills and fabricators are behind on deliveries and some building operations will not be started as soon as expected because the steel will not be on the ground at the time it was promised. Nearly all of the larger steel companies are virtually out of the market. Though they have, in some cases, open capacity for second quarter they do not care to load up too heavily under present conditions. Plates can be had in three or four weeks, but to obtain such delivery the buyer is forced to pay 2.35c. to 2.50c., Pittsburgh, most of the Eastern mills quoting the latter price. Shapes and bars are also quotable at 2.35c. to 2.50c., Pittsburgh, with the tendency strongly toward the higher figure. All indications are that quotations below 2.50c. for early delivery will shortly disappear. There is somewhat more of an inclination on the part of steel companies not to let prices get away from them. Under present circumstances 2.50c., Pittsburgh, is regarded by the mills as a fair price, and possibly some effort will be made by the stronger factors in the trade not to let quotations go above that figure. One of the largest inquiries in the market is for 8000 to 10,000 tons of ½ and 7/16-in. plates for an extension of the Catskill Aqueduct pipe line. Two or three steel pipe fabricators are asking steel mills for protection on this tonnage. The bids for the work are being received by the Board of Water Supply, New York, and will be opened March 20. The concrete bars for the Jamaica Bay causeway, 4500 tons, have been awarded to the Concrete Steel Co.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, plates and structural shapes, 2.69c. to 2.84c.; bar iron, 2.59c. to 2.74c.

Old Material.—The upward movement in prices continues strong with No. 1 heavy melting steel $1 per ton higher this week. Demand for all grades is heavy and available material scarce. With a sustained improvement in weather conditions, a quantity of scrap accumulated in the New England district is expected to appear, but such tonnage it is not believed will materially affect prices. On a new contract last week,

the Bethlehem Steel Co. is paying $24 for railroad quality heavy melting steel, and this is generally the price being paid for delivery to eastern Pennsylvania mills on strictly No. 1 grade. Forge fire is an active item, shipments going forward to Principio, Phoenixville, Parkesburg, Harrisburg and Bethlehem. Borings and turnings are quotable this week at $15.50 to $16 per ton, buying price New York, with demand from Phoenixville, Harrisburg and Bethlehem. On stove plate about the highest being paid is for delivery to West Mahwah, N. J., a foundry there paying $21.50 per ton. Specification pipe is in demand for shipment to Milton, Columbia and Lebanon, Pa. The last mentioned is now paying $20 per ton delivered.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard	$19.00 to $19.50
Steel rails, short lengths, or equivalent	20.25 to 20.75
Rails for rolling	21.00 to 22.00
Relaying rails, nominal	29.00 to 30.00
Steel car axles	22.00 to 22.50
Iron car axles	29.00 to 30.00
No. 1 railroad wrought	21.00 to 22.00
Wrought iron track	20.25 to 20.75
Forge fire	15.50 to 16.00
No. 1 yard wrought, long	19.50 to 20.00
Cast borings (clean)	15.50 to 16.00
Machine-shop turnings	16.00 to 16.50
Mixed borings and turnings	15.50 to 16.00
Iron and steel pipe (1 in. diam., not under 2 ft. long)	15.50 to 16.00
Stove plate	18.00 to 18.50
Locomotive grate bars	18.00 to 19.00
Malleable cast (railroad)	21.50 to 22.00
Cast-iron car wheels	21.00 to 22.00

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast	23.50 to 24.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	20.50 to 21.50
No. 1 heavy cast, not cupola size	18.50 to 19.50
No. 2 cast (radiators, cast boilers, etc.)	19.00 to 20.00

Birmingham

Advance in Pig Iron Prices Follows Increase in Wages of Miners

BIRMINGHAM, ALA., March 6.—Automatically with the announcement of a 12½ to 15 per cent wage increase at ore and coal mines by the Tennessee company and all other large independent operators, Birmingham pig iron advanced to $26. By Saturday all merchant interests were on that base. Sales of 1200, 400 and 500 tons at $26 were made by one maker Friday. A leading pipe maker bought 5000 tons at $25 just ahead of the advance, a Chicago melter took 2000 tons and a large tonnage was booked at $25 in the Middle West. A leading producer said: "Alabama iron makers have sold between 700,000 and 800,000 tons since Jan. 1. Spot is very scarce. I never knew a stronger market. The wage advance means $1 more a ton to produce. In advancing $1 we simply absorb the added cost." The prospect of additional production is looming. The Sloss-Sheffield Steel & Iron Co. promises a sixth stack in April, being now engaged in repairs on a North Birmingham stack. The Alabama Co.'s second Gadsden stack is scheduled for Saturday and Oxmoor stack of the Tennessee company is not far behind. They will serve to increase Alabama production to close to 260,000 tons a month. The largest foundry maker opened for third quarter Saturday. All are selling some third quarter iron either directly or as part of second quarter orders. The Southern melt is at a new high point in both iron and steel. Some contracts now out will be closed this week at $25, but new customers need not expect anything under $26 from now on.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	$26.00
Basic	24.00
Charcoal, warm blast	34.00

Cast Iron Pipe.—Pressure pipe deliveries are not promised prior to June on any size. DeLavaud is in demand to capacity of production. The base is a minimum of $45. Sanitary pipe is persistently active at $70 for standard.

Finishing Mills.—All steel works are as close to 100 per cent as machinery allows. New customers find it difficult to place business at all. The Tennessee company is moving 3000 tons of rails for Japan down the Warrior to Mobile. Steel bars are quoted 2.50c., Birmingham.

Coal and Coke.—The Tennessee company has announced effective March 15 a 12½ to 15 per cent ore and coal mine wage increase, the third since last May and now representing approximately a total of 50 per cent advance. A total of 35,000 coal and ore workers are affected.

Old Material.—The scrap market is very active, all sorts of material moving freely and yards reducing stocks. Some advances have been made.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	$16.00 to $17.00
No. 1 steel	14.00 to 16.00
No. 1 cast	20.00 to 22.00
Car wheels	20.00 to 22.00
Tramcar wheels	19.00 to 20.00
Stove plate	16.00 to 17.00
Cast-iron borings	12.00 to 13.00
Machine shop turnings	12.00 to 13.00

Boston

Pig Iron Continues Active and Is Firmer — Transportation Situation Bad

BOSTON, March 6.—Active buying in small lots featured the pig iron market the past week. But one melter took as much as 1000 tons, a Connecticut cutlery maker buying that much of No. 2X. Buffalo iron has advanced from $28 to $28.50, furnace base, eastern Pennsylvania from $28 to $29, and Virginia from $26 to $27 and from $27 to 28, recent bookings being at old and new prices. So many Alabama furnaces are out of the market it is difficult to establish a quotation. It develops Alabama sold in this territory the past fortnight at $25, furnace base; that recent large tonnages of Buffalo went at $27, furnace base; that eastern Pennsylvania furnaces wavered on differentials, and that iron taking an eastern Pennsylvania freight rate into New England cut $28, furnace base, to secure business. Also that heater makers bought several thousand tons more than first reported, domestic iron only being involved. Spot foreign iron is tight on a basis of $32 dock here, plus duty, for Sotch silicon 2.50 plus, with available supplies short.

We quote delivered prices on the basis of the latest reported sales, now infrequent, and as follows, having added to furnace prices $3.65 freight from eastern Pennsylvania, $4.91 from Buffalo, $5.92 from Virginia and $9.60 from Alabama:

Eastern Penn., sil. 2.25 to 2.75	$33.15 to $33.65
Eastern Penn., sil. 1.75 to 2.25	32.65
Buffalo, sil. 2.25 to 2.75	33.41 to 33.91
Buffalo, sil. 1.75 to 2.25	32.91 to 33.41
Virginia, sil. 2.25 to 2.75	33.42 to 34.42
Virginia, sil. 1.75 to 2.25	32.92 to 33.92
Alabama, sil. 2.25 to 2.75	35.10 to 36.10
Alabama, sil. 1.75 to 2.25	34.60 to 35.60

Finished Material.—Bids are asked on 1250 tons of structural steel for a Maine Central Railroad, Topsham, Me., bridge and on 1000 tons for the McElwain, Manchester, N. H., bridge. The Boston Bridge Works has been awarded 150 tons for the Cambridge Savings Bank, Cambridge, Mass. Large structural tonnages are held up pending possibility of legislation which will permit an increase in the height of Boston buildings. The Bancroft & Martin Rolling Mill Co., Boston, is low bidder on 200 tons reinforcing rods wanted by the local transit commission. Its bid was $11,493. Common steel bars sold the past week at 3c., Pittsburgh, June delivery. There are heavy tin plate and bar specifications, in some instances covering requirements during the next three months. A large forgings order is about to be closed. Two inquiries aggregating 800 tons street railway rails are in the market. The American Steel & Wire Co. is 17 weeks behind on wire nail deliveries.

Iron Importations.—Importations of iron for the week ending March 3 were 300 tons of Belgian. Crocker Brothers received 50 tons of English manganese. During the previous week 4400 tons of Belgian iron were received at this port.

Warehouse Business.—Best refined iron has advanced $5 a ton and all other iron and steel products,

spring and cold rolled steel and Wayne and Norway iron excepted, $3 a ton. The demand for iron and steel is increasing. Higher prices on wire and cut nails are indicated. Small iron rivets have been marked up 33 1/3 per cent. Babbitt, in small lots, is now 40c. a lb.

Jobbers quote: Soft steel bars, $3.36½ per 100 lb.; flats, $4.15; concrete bars, $3.51½ to $3.64; structurals, angles, channels and beams, $3.46½; tire steel, $4.80 to $5.15; open-hearth spring steel, $5 to $6.50; crucible spring steel, $12; bands, $4.55 to $5.05; hoop steel, $5.05 to $5.55; cold rolled steel, $4.30 to $4.80; toe calk steel, $6.15; refined iron, $3.36½ per 100 lb.; best refined iron, $4.75; Wayne iron, $5.50; Norway iron, $6.60 to $7.10; steel plates, $3.46½ to $3.70; No. 10 blue annealed sheets, $4.36½.

Coke.—Milder weather has somewhat lessened the strain placed on coke producers in this territory to supply domestic wants. For that reason an increase in by-product foundry coke shipments is expected. The lack of cars still hampers shipments, however, and some small foundries are pressed for fuel. The New England Coal & Coke Co. continues to quote foundry coke at $16 a ton delivered within the $3.10 freight zone, and the Providence Gas Co., $15. Little interest was shown in Connellsville foundry cokes in New England the past week, notwithstandig the fact they can be purchased for less than local fuels.

Old Material.—Chemical borings, shafting, car wheels and rails for rerolling are worth no more than a week ago, but on other old material there has been a general advance averaging 50c. a ton. Heavy melting steel has appreciated about $1, and average asking prices for car axles are raised about $2. The higher prices are due more to a scarcity of material than to any increase in demand. Holders of material are indisposed to sell until they have shipped some of the unfilled tonnage on books. The transportation situation is still very bad, and the keynote to the New England scrap situation. A sale of 100 tons of heavy melting steel for Pittsburgh district delivery at $19.50 on cars, shipping point, is reported, a new high record for this movement. Firms paying $4.10 a fortnight or so ago for wrought pipe last week bought several carlots at $15.50 shipping point. The demand for machinery and textile cast is heavier than it has been in months. Foundries are melting more scrap now because they cannot get prompt pig iron shipments. Sales of No. 1 machinery are reported at $26.50 and $27, but the freight in each instance is high. For common rate points the market is nearer $25 to $25.50 delivered. A railroad equipment maker is again in the market for stove plate, which is scarce, but as dealers will pay $1 more, is getting little material.

The following prices are for gross ton lots delivered common rate consuming points:

No. 1 machinery	$25.00 to $25.50
No. 2 machinery	23.00 to 23.50
Stove plate	19.50 to 20.00
Railroad malleable	25.00 to 26.00
Street car wheels	22.50 to 23.00
Bundled sheets	17.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$18.50 to $18.75
No. 1 railroad wrought	20.00 to 20.50
No. 1 yard wrought	18.00 to 18.50
Wrought pipe (1 in. in diam., over 2 ft. long)	15.00 to 15.50
Machine shop turnings	14.00 to 14.50
Cast iron borings, rolling mill	15.00 to 15.50
Cast iron borings, chemical	19.00 to 19.50
Blast furnace borings and turnings	13.50 to 14.00
Forged scrap and bundled skeleton	14.50 to 15.00
Shafting	21.50 to 22.00
Rails for rerolling	19.50 to 20.00

Cincinnati

Pig Iron Market Strong with Prices Advanced $1

CINCINNATI, March 6.—The pig iron market continues strong and fairly active, and prices in Birmingham and southern Ohio districts have advanced $1 a ton. The two active producers of foundry and malleable grades in southern Ohio are now quoting $30, furnace, one furnace is out of the market, and another is on Bessemer, on which it has available 1000 tons for March shipment. In the South, the leading producer advanced on Saturday to $26 and, with the possible exception of a Tennessee furnace, this price is now minimum on first and second quarter. Some furnaces are out of the market entirely for second quarter, and are quoting $27 for third. Sales are being made for all deliveries. We note a sale of 1000 tons of Southern to a Michigan stove manufacturer last week at $2[illegible] base, and one of 500 today, by the same furnace, to a southern Ohio melter, at $26. The L. & N. Railroad bought 1000 tons of various grades at $26, base Birmingham. An Indiana steel maker is reported to have bought 2000 tons of basic from a Valley interest at above $28.50. A Columbus melter took 1000 tons of malleable at $29, Ironton, and a Michigan motor car manufacturer 1000 tons of charcoal at $31.50. A sale of 500 tons of silvery was also reported at the schedule. Inquiries are light, an Indiana melter asking for 1000 tons of malleable, a Michigan stove maker for 1000 tons of foundry, besides a number of smaller ones.

Based on freight rates of $4.05 from Birmingham and $2.27 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$30.05
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	30.55
Ohio silvery, 8 per cent	38.77
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	32.27
Basic Northern	30.27
Malleable	32.27

Tool Steel.—Some companies have advanced the price of high speed steel 5c. per lb., but the range continues to be from 75c. to 95c. per lb. for 18 per cent tungsten high speed steel. The demand is showing a very great improvement.

Finished Materials.—The demand continues strong, and as most first quarter contracts have already been specified, it is expected that consumers of steel will have some difficulty in securing enough materials for their full requirements. Bars, shapes and plates are very active, and much business that would ordinarily go to mills is now being booked by warehouses. Prices are very strong, and while 2.25c. continues to be quoted for indefinite delivery, mills capable of making even 60-day delivery could easily secure 2.40c. to 2.50c. To illustrate the need of some plate consumers, it is reported that a consumer in this district had offered 2.75c., Pittsburgh, on a fair-sized tonnage. Mills are going slowly in taking on business, however, and many of them are said to be booked solid for entire second quarter. There is a big demand for sheets, particularly automobile body sheets, and premiums above the 5.35c. price are freely offered for any delivery. Automobile body seconds are also in heavy demand at 5.20c. On blue annealed, the range is 2.65c. to 3c., on black, 3.50c. to 4c., and on galvanized, 4.65c. to 5c. Wire products are also in demand, and it is said that further price advances are to be made within the next week or two. Considerable activity is evident in the building industry, and during the past week a number of new projects came out. These included an Elks' temple at Indianapolis, 600 tons, track elevation work for the Big Four Railroad at Indianapolis, 600 tons, and foundation work for the Louisville Railway Co., 100 tons. Included in awards were a factory building for the Williamson Heater Co., Cincinnati, 300 tons, and a department store at Lexington, Ky., 125 tons. A number of projects calling for a considerable aggregate tonnage of reinforcing bars appeared, including road work for the State of Indiana, 400 tons, office building at Indianapolis, about 300 tons, and school buildings at Cincinnati and Norwood, Ohio, each 200 tons. The United States Engineers' office, Louisville, Ky., will open bids April 10 on Dam No. 47, involving about 3000 tons of steel work. The Louisville & Nashville Railroad has issued an inquiry for 4000 all-steel hopper cars, 200 composite gondolas, and 2000 box cars.

Warehouse Business.—Local jobbers have advanced prices on all products, except wire and wire nails, from $3 to $6 a ton. The demand is very heavy, and orders running up to 100 tons are becoming common. Wire products are in increasing demand for early shipment.

Cincinnati jobbers quote: Iron and steel bars, 3.40c.; reinforcing bars, 3.50c.; hoops, 4.45c.; bands, 4.15c.; shapes, 3.50c.; plates, ¼-in. and heavier 3.50c., lighter 3.75½c.; cold-rolled rounds, 4.20c.; cold-rolled flats, squares and hexagons, 4.70c.; No. 10 blue annealed sheets, 4.15c.; No. 28 black sheets, 5c.; No. 28 galvanized sheets, 6c.; No. 9 annealed wire, $3.30 per 100 lb.; common wire nails, $3.30 per keg, base.

Coke.—An inquiry for 50,000 tons of foundry coke per month from a large blast furnace operator is current, as well as one for 7000 tons from a southern Ohio furnace. The coke market has developed some strength, largely accounted for by the report that a large export order for coal and coke is being negotiated. Prices are up from 25 to 50c. in all districts, and prompt shipment coke is commanding a premium from a certain portion of the trade. We quote Connellsville foundry, $8.50 to $9.50; furnace, $7 to $7.50; New River foundry, $12 to $14; Wise County foundry, $8.50 to $9.50; furnace, $7 to $7.50; by-product foundry, $11; Connellsville and Southern coke at $8.50 to $9.

Old Material.—Steel companies operating in this district continued to place orders for steel grades, and the demand for foundry grades has also improved. Higher prices prevailing in other districts have resulted in dealers shipping tonnage from this territory, and has tended to further advance prices locally.

We quote dealers' buying prices, f.o.b. cars Cincinnati:

Per Gross Ton	
Bundled sheets	$17.00 to $17.50
Iron rails	20.00 to 20.50
Relaying rails, 50 lb. and up	29.00 to 29.50
Rails for rolling	21.50 to 22.00
Heavy melting steel	21.00 to 21.50
Steel rails for melting	20.00 to 20.50
Car wheels	22.50 to 23.00
Per Net Ton	
No. 1 railroad wrought	18.50 to 19.00
Cast borings	15.50 to 16.00
Steel turnings	15.00 to 15.50
Railroad cast	21.50 to 22.00
No. 1 machinery cast	23.50 to 24.00
Burnt scrap	15.50 to 16.00
Iron axles	26.50 to 27.00
Locomotive tires (smooth inside)	19.00 to 19.50
Pipes and flues	15.50 to 16.00

Buffalo

Pig Iron Prices Higher—Labor Shortage an Important Factor

BUFFALO, March 6.—Higher prices on pig iron are quoted by all the selling factors, but March sales to date are not in proportion to a corresponding period in the latter days of February. The total business of that month exceeded 100,000 tons. Quotations of $27.50 made in various instances to meet competition in New England, appear now to have been withdrawn, and while it is possible to buy at $28 base, the majority of furnaces are quoting $29 for No. 2 plain; only one maker is quoting $28.50 base. The Bethlehem Steel Co. is out of the market for Lackawanna iron and has seven furnaces in blast. Because of the labor situation which affects all the mills, there is little likelihood of increased furnace operation in the district. Inquiry is somewhat quiet and most of the tonnages taken have been for May and June delivery. The 50c. differential is not steady; two furnaces are quoting $29 for No. 2 plain, $29.50 for silicon 2.25 to 2.75, and $30 for silicon 2.75 to 3.25.

We quote f.o.b. per gross ton Buffalo as follows, the higher price being for early shipment:

No. 1 foundry, 2.75 to 3.25 sil.	$29.50 to $30.00
No. 2X foundry, 2.25 to 2.75 sil.	28.50 to 29.00
No. 2 plain, 1.75 to 2.25 sil.	28.00 to 28.50
Basic	28.00
Malleable	28.00 to 29.00
Lake Superior charcoal	34.78

Finished Iron and Steel.—The entire situation with sellers is tighter and shows no promise of relief; mills are facing the worst labor situation in several years, and with the approach of the new construction season and consequent exodus of common labor, there is no immediate improvement in sight. As an instance of the tighter policy on commitments, one agency which has been booking cold-finished material freely—the only product it has been able to sell without restriction for months—has now shut down and will sell only its regular trade. The Bethlehem Steel Co. has sold its expected Lacakawanna production of bars, shapes, plates and billets. Warehouse demand is tremendous, and unusual tonnages are being offered. The problem is one of keeping stocks intact rather than of selling. Warehouse prices advanced, effective March 1. Sellers having plates available are asking 2.35c., and some Eastern agencies are reported asking 2.40c. and 2.50c. Minimum bar prices are 2.25c. and a local independent is quoting 2.35c. and 2.40c. Demand for pipe and wire is especially insistent. Some of the desirable inquiries include one for 12,000 to 15,000 tons of billets for vicinity delivery and a 500-ton bar inquiry in three sizes. Black sheets are quoted at 3.60c. to 3.70c. for April delivery only.

We quote warehouse prices, Buffalo, as follows: Structural shapes, 3.50c.; plates, 3.50c.; soft steel bars, 3.40c.; hoops, 4.50c.; bands, 4.20c.; blue annealed sheets, No. 10 gage, 4.20c.; galvanized steel sheets, No. 28 gage, 6.10c.; black sheets, No. 28 gage, 5.10c.; cold rolled round shafting, 4.25c.

Old Material.—Mills are active and dealers have advanced their prices on practically all products. Railroad lists closed last week but very little of the material came to Buffalo, most of it going to Youngstown and Cleveland. Dealers' stock piles are reduced.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	$23.00 to $24.00
Low phos., 0.04 and under	25.00 to 26.00
No. 1 railroad wrought	21.00 to 21.50
Car wheels	22.00 to 23.00
Machine shop turnings	16.25 to 17.00
Cast iron borings	17.50 to 18.00
No. 1 busheling	21.50 to 22.00
Heavy steel turnings	20.00 to 20.50
Stove plate	20.50 to 21.00
Grate bars	19.50 to 20.00
Bundled sheet stampings	16.25 to 16.75
No. 1 machinery cast	26.00 to 27.00
Hydraulic compressed	22.00 to 22.50
Railroad malleable	25.50 to 26.00

St. Louis

Furnace Company Sold Up for First Half—Stove Business Improving

ST. LOUIS, March 6.—With the sale of 2500 tons of basic pig iron to one East Side melter and 400 tons of foundry iron to another East Side melter, the St. Louis Coke & Chemical Co. is now unable to take on any additional business for delivery until after July 1. Orders for more than 2000 tons for early shipment were declined. Some Southern iron has been delayed in transit, resulting in melters turning to St. Louis and other Northern makers for supplies. A Quincy, Ill., stove manufacturer bought 1300 tons of Southern iron, while a St. Louis engine maker bought 500 tons of Southern foundry grades. The Federal Reserve Bank of St. Louis reports that the melt in this district in January was approximately 2¾ per cent larger than the previous month, and 17½ per cent larger than in January, 1922. A greater increase is expected to be shown in the February report. The stove busines is increasing, seven reporting interests showing 81.6 per cent greater sales in December than the same month in 1921. The market is strong at $30, Chicago, for Northern iron and $25 for Southern, with the Granite City furnace quoting $31.50 to $32.50 there.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices $2.16 freight from Chicago, $3.28 from Birmingham (rail and water), $5.17 from Birmingham, all rail, and 81 cents average switching charge from Granite City:

Northern fdy., sil. 1.75 to 2.25	$32.16
Northern malleable, sil. 1.75 to 2.25	32.16
Basic	32.16
Southern fdy., sil. 1.75 to 2.25	$30.17 to 32.17

Coke.—Warmer weather has caused a slump in the demand for domestic coke, although the Granite City by-product producer is still well sold up. Its domestic price is $10.50, with foundry quoted nominally at $14, furnace. The market on Connellsville grades is easier.

Finished Iron and Steel.—Heavy demand for finished iron and steel continues, with no relief from the mills in the way of taking on more business. With the mills turning down orders, the business of jobbers is increasing all the more. The contract for 1050 tons of reinforcing bars for the Missouri Pacific grain elevator at the foot of Primm Street, St. Louis, went to the Laclede Steel Co. On March 1 warehouse prices on plates, shapes and bars were advanced $4 a ton, while sheets were advanced $3 a ton. One St. Louis railroad

bought three tons of carbon tool steel on the basis of 13.50c. per lb., St. Louis. The Union Pacific Railway is in the market for 75 tons of boiler and fire box plates The International & Great Northern Railroad wants 100 wheels, and a Texas traction company is in the market for 250 wheels.

For stock out of warehouse we quote: Soft steel bars, 3.25c. per lb.; iron bars, 3.25c.; structural shapes, 3.35c.; tank plates, 3.35c.; No. 10 blue annealed sheets, 4.25c.; No. 28 black sheets, cold rolled, one pass, 5c.; cold drawn rounds, shafting and screw stock, 4.25c.; structural rivets, 3.90c. per 100 lb.; boiler rivets, 4c.; tank rivets, $\frac{7}{8}$ in. and smaller, 55 per cent off list; machine bolts, large, 50 per cent; smaller, 50 per cent; carriage bolts, large, 45 per cent; small, 45 per cent; lag screws, 55 per cent; hot pressed nuts, square or hexagon blank, $2.75; and tapped, $2.75 off list.

Old Material.—Further advances were recorded this week in prices of old material. Very little material is being offered, and no railroad lists are out. Rolling mill grades are in good demand. American Steel Foundries was a heavy purchaser during the week.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails	$21.50 to $22.00
Rails for rolling	22.50 to 23.00
Steel rails, less than 3 ft.	23.00 to 23.50
Relaying rails, standard section	31.00 to 33.00
Cast iron car wheels	28.50 to 29.00
Heavy melting steel	21.50 to 22.00
Heavy shoveling steel	20.00 to 20.50
Frogs, switches and guards cut apart	21.50 to 22.00
Per Net Ton	
Heavy axles and tire turnings	16.00 to 16.50
Steel angle bars	20.50 to 21.00
Iron car axles	28.50 to 29.00
Steel car axles	23.50 to 24.00
Wrought iron bars and transoms	24.00 to 24.50
No. 1 railroad wrought	19.00 to 19.50
No. 2 railroad wrought	19.00 to 19.50
Railroad springs	24.50 to 25.00
Steel couplers and knuckles	24.50 to 25.00
Cast iron borings	14.50 to 15.00
No. 1 busheling	17.00 to 17.50
No. 1 railroad cast	22.50 to 23.00
No. 1 machinery cast	23.00 to 23.50
Railroad malleable	23.00 to 23.50
Machine shop turnings	14.00 to 14.50

Cleveland

Pig Iron Prices Again Advanced—Detroit Blast Furnace Is Wrecked

CLEVELAND, March 6.—With the heavy ore consumption some blast furnaces are beginning to take an interest in the market and prices for the season may be named almost any day, although it is not expected that they will be announced before April 1. There is no change in the situation in respect to the probable prices, the consensus of opinion evidently being that the price advance will be at least 50c. a ton. There is still some demand for dock ore. Inquiries are pending for two or three lots, one of 10,000 tons. For prices, see page 714.

Iron Ore Shipments.—During February there was 495,527 gross tons of Lake Superior iron ore shipped from Lake Erie docks as compared with 166,507 tons during February last year. With the increased shipments during the past winter as compared with a year ago, the amount of ore on dock March 1 has become less than on the same date a year ago. On March 1 there was 7,917,984 tons on docks as compared with 8,057,958 tons on March 1, 1922. Monthly figures heretofore during the winter have shown more ore on docks than at the corresponding time last year.

Pig Iron.—Several furnaces have made further price advances of from 50c. to $1 a ton on foundry iron. While a fair volume of business was booked during the week, sales have fallen off following the recent heavy buying for the second quarter, as most consumers are now under contract for that delivery. However, several leading producers are practically sold up for the second quarter and are out of the market and the available supply has become scarcer. A shortage that was developing in the Michigan territory is expected to become more acute owing to an accident at the plant of the Hanna Furnace Co. in Detroit, March 1, when that company's furnace B was wrecked by an explosion beneath the stack. A fire was started which burned the blowing engine house and necessitated the shutting down of furnace A, but it is expected that the operations of this furnace will be resumed today or tomorrow. The wrecked furnace will have to be rebuilt and cannot be placed in operation within 60 days. The output of both Detroit furnaces had been sold through the second quarter. The Hanna company has started to ship iron from Buffalo on some of its Detroit contracts. The local price on foundry iron has been advanced $1 a ton to $31 by the only producer who has iron left to offer and that is only for prompt shipment. Valley furnaces have advanced to $30 and booked considerable business at $28 and $29 before the advance. Another producer is asking $30 to $30.50 and a minimum price now quoted by another furnace operated by Cleveland interests is $29. With higher prices sellers have advanced their silicon differentials on foundry grades from 50c. to $1 a ton. A sale of 150 tons running from 2.75 to 3.25 in silicon was made by a Valley furnace at $32 based on the increased differentials. A local foundry during the week purchased 1000 tons of foundry iron and 1000 tons of malleable at $28.50, this sale being made by an outside furnace having a $1.77 freight rate. One producer sold several lots aggregating 10,000 tons and turned down considerable tonnage. Several additional inquiries came out for third quarter contracts, on which producers refuse to quote. Several steel makers are inquiring for basic iron, but the supply is very limited. An offer of $28, Valley, was made by a Sharon consumer for 2000 tons and an offer of $29 is reported. Several Southern producers have advanced Southern iron to $26 and are quoting that price through the third quarter. A number of sales are reported at the advance.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron includes a 50c. switching charge. Ohio silvery and Southern iron prices are based on a $3.02 freight rate from Jackson and a $6 rate from Birmingham:

Basic, Valley furnace	$28.00 to $28.50
Northern No. 2 fdy., sil. 1.75 to 2.25	31.00 to 31.50
Southern fdy., sil. 1.75 to 2.25	31.00 to 32.00
Malleable	31.00 to 31.50
Ohio silvery, 8 per cent	39.00
Standard low phos., Valley furnace	35.00

Semi-Finished Steel.—The price of sheet bars, billets and slabs has been established at $45, Youngstown, for April shipment by the sale of 50,000 tons for that delivery by a Cleveland mill that has been out of the market for some time. The most of the tonnage booked was in sheet bars in lots up to 10,000 tons.

Bolts, Nuts and Rivets.—A price advance of approximately 10 per cent was made March 1 on bolts and nuts including semi-finished hexagon nuts. Some second quarter contracts have been taken at new prices. Manufacturers are showing considerable concern over the scarcity of steel and labor. Although some rivet manufacturers have advanced prices $5 a ton, the advance is not general and these can still be bought at 3c. for structural, 3.10c. for boiler and 65 and 5 per cent off the list for small rivets. Makers are getting heavy specifications from car and locomotive builders, but not much new business, as most consumers are under contract.

Reinforcing Bars.—Prices on rail steel bars have stiffened and 2.35c. is now being quoted by some of the mills on sizable lots. While the 2.25c. price has not disappeared, it seems probable that it will be withdrawn. The Franklin Steel Works has taken 475 tons for a building for the W. S. Tyler Co., Cleveland.

High Speed Steel.—The demand for high speed steel has become heavy, and deliveries by some manufacturers have become slow. Prices are firm at 75c. to 80c. per lb. for 18 per cent tungsten steel, with some makers quoting 90c.

Warehouse Business.—Local warehouse prices have been advanced $3 a ton on steel bars, plates, structural material and hoops and bands, and several jobbers have marked up sheets $2 to $5 a ton. A wide spread exists on blue annealed sheets. No change has been made on cold-rolled steel.

Finished Material.—Stimulated by advancing prices,

inquiry is still plentiful, but the supply of steel is growing scarcer, as more mills have withdrawn from the market, and prices continue to move upward. On steel bars, plates, and structural material 2.25c. is still the minimum quotation for extended delivery. Practically no steel bars are being offered for early shipment except from warehouse stocks. The plate situation has become tighter and deliveries further extended. One Eastern mill has withdrawn from the market in this territory, and another continues to quote 2.55c. at mill for delivery in six to eight weeks, and considerable business is being booked at this price. One Eastern mill has withdrawn from the market on structural shapes, and another is quoting plain material at 2.50c., at which early shipment sales are being made. The Cleveland mill price on plates is 2.65c., Pittsburgh, but the supply is very limited. Agricultural implement manufacturers are inquiring for steel for the third quarter. The demand from rivet manufacturers is heavy. Automobile plants in the Michigan territory are operating to the extent that deliveries of steel permit. Considerable inquiry is coming from the railroads for track material. The Standard Oil Co. has placed 20 stills for its Toledo refinery, requiring 500 tons of plates with a Louisville shop, and has placed 300 tons of structural material for the same work. Rebuilding of 2000 coke cars for the Baltimore & Ohio Railroad will require 7000 tons of steel. The alloy steel market has become more active.

Sheets.—Leading independent makers have named 5.35c. as the price for automobile body sheets, and during the week booked a heavy tonnage for the second quarter, the demand being in excess of the supply. Prices on other sheets are unchanged at 3.60c. for black, 2.90c. to 3c. for blue annealed and 4.75c. for galvanized for April shipment.

Jobbers quote steel bars, 3.21c.; plates and structural shapes, 3.31c.; No. 9 galvanized wire, 3.30c.; No. 9 annealed wire, 2.80c.; No. 28 black sheets, 4.60c.; No. 28 galvanized sheets, 5.75c.; No. 10 blue annealed sheets, 3.60c. to 3.91c.; cold-rolled rounds, 3.90c.; flats, square and hexagons, 4.40c.; hoops and bands, 1 in. and wider and 20 gage or heavier, 4.10c.; narrower than 1 in. or lighter than No. 20 gage, 4.51c.

Coke.—There is a fair demand for foundry coke in small lots. Prices are unchanged at $8.50 to $9 for standard Connellsville grades.

Old Material.—The upward price trend has continued with advances during the week of from 50c. to $2 a ton. However, the higher prices do not seem to bring out much material. Many dealers are looking for further advances and are not trying to make sales. Not much buying is being done by the mills. During the week a local consumer bought a few small lots of heavy melting steel at prices ranging from $24 to $25 delivered, and a Valley mill is reported to have paid $26.50 for the same grade. A dealer paid as high as $26 for heavy melting steel delivered to a Valley consumer, and the same price is now being quoted to local mills.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	$23.25 to $23.50
Rails for rolling	26.00 to 27.00
Steel rails under 3 ft.	25.00 to 25.50
Iron rails	22.00 to 22.50
Iron car axles	30.00 to 31.00
Low phosphorus melting	25.00 to 26.00
Cast borings	19.00 to 19.25
Machine shop turnings	17.50 to 18.00
Mixed borings and short turnings	18.50 to 18.75
Compressed steel	21.00 to 22.00
Railroad wrought	21.00 to 21.50
Railroad malleable	25.00 to 26.00
Light bundled sheet stampings	18.25 to 18.50
Steel axle turnings	20.00 to 20.50
No. 1 cast	24.00 to 26.00
No. 1 busheling	18.00 to 18.50
Drop forge flashings over 10-in.	16.75 to 17.25
Drop forge flashings under 10-in.	17.25 to 17.75
Railroad grate bars	20.50 to 21.00
Stove plate	20.50 to 21.00
Pipes and flues	18.00 to 18.50

The plant of the Falcon Tin Plate Co. at Canton, Ohio, owned by Youngstown interests, will be started April 1 after a suspension since the first of the year. It will at first operate on tin mill black sheets and will later work into tinplate.

Philadelphia

Market Strong in All Branches—Many Producers Have Little Now to Sell

PHILADELPHIA, March 6.—The market gains in strength each week. The most spectacular advances of the past week have been in old material. On active buying of heavy melting steel scrap there has been a rise of $2 a ton, upward of 30,000 tons having been sold at $24, delivered, to Eastern mills. Other grades of scrap have gone up proportionately. In finished steel, the situation is stronger in that the sources of supply at the lower end of the price range are becoming fewer and fewer. While plates, shapes and bars are quotable from 2.25c. to 2.50c., Pittsburgh, it is very difficult today to get any of these commodities for early delivery at less than 2.35c., Pittsburgh, and numerous sales, particularly of plates, have been made at 2.50c., Pittsburgh. Foundry pig iron has not only maintained its advance of $1 a ton a week ago, but some producers have added another dollar to the price, but are selling very little at the higher level; in fact, their advance was made to avoid taking business.

Pig Iron.—While the demand for foundry iron has eased off considerably, the market presents an appearance of increasing strength, due largely to the fact that furnaces in this district have large backlogs and are not anxious for more business at current prices. Most of the larger buyers of foundry iron in this district have covered their requirements for second quarter, but the smaller buyers are flocking in for 100 to 500-ton lots and some of them are having difficulty in finding furnaces willing to quote. In one instance a buyer took Virginia iron because he could not obtain eastern Pennsylvania iron. Sales of Virginia iron have been heavier in the past week. One furnace, which has a large stock pile, booked nearly 5000 tons in a week, which was more than it had sold in several weeks preceding. One Virginia company has advanced its minimum quotation to $28, and others may follow. In basic iron there is renewed activity. One structural steel mill, not regularly a user of basic, bought 5000 tons and had inquired for 10,000 tons. Slightly under $28.50, delivered, was paid. It is expected that the American Bridge Co. may cover its second and third quarter requirements in the East if it is possible to do so. Another inquiry is in the market for a few thousand tons for second quarter. A maker of copper bearing low phosphorus iron last week sold 2000 tons in several lots, the price remaining at $30, furnace. A number of Eastern furnaces will be put in blast this month and next, but to a certain extent the output has already been covered by sales. The Midvale Steel & Ordnance Co. is completing the rebuilding of its No. 3 furnace, which will have a daily capacity of 600 tons, but the putting on of four additional open-hearth furnaces this week at the company's Coatesville works will require considerably more hot metal. Other furnaces which will shortly go in are Delaware River, Parryville, Everett, Temple and a second Warwick stack, but the latter will probably not be ready until next month. The Replogle Steel Co. is also planning to put another furnace in blast at Wharton, N. J. The demand for domestic copper free low phosphorus iron has not been active owing to the lower prices quoted on imported iron, hence the Standish furnace may soon go out of blast. The Pennsylvania Railroad is in the market for 6000 tons of iron for second quarter. Of this 2000 tons is standard foundry grades and 4000 tons is approximately the analysis of basic iron. Prices of foundry iron are firmer. While some furnaces are still quoting $29 on No. 2 plain and $30 on No. 2X, a few have advanced their quotations to a minimum of $30. Basic would now be quoted at not less than $28, furnace. Some grades of foreign iron have disappeared from this market. Scotch and English foundry are no longer obtainable, and prices on Continental foundry grades have advanced slightly. Last week's receipts of foreign iron were 1992 tons from England and 250 tons from Sweden. It is not unlikely that American iron

may be exported to Europe. The Singer Sewing Machine Co. is inquiring for 2000 tons of American iron for export to its Scottish works.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76 cents to $1.64 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$30.14 to $30.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	31.14 to 31.76
East. Pa. No. 1X	32.14 to 32.76
Virginia No. 2 plain, 1.75 to 2.25 sil.	32.17 to 33.17
Virginia No. 2X, 2.25 to 2.75 sil.	33.17 to 34.17
Basic delivered eastern Pa.	28.50 to 29.00
Gray forge	28.50 to 29.00
Malleable	31.14 to 31.26
Standard low phos. (f.o.b. furnace) nominal	35.00
Copper bearing low phos. (f.o.b. furnace)	30.00

Foreign Pig Iron

All prices f.o.b. cars Philadelphia, duty paid.

Continental foundry, 1.80 to 2.50 sil.	$28.50
Continental foundry, 2.50 to 3 sil.	29.50
Low phos., copper free, guar. not over 0.035 per cent phos.	$30.00 to 32.00
Continental, phos. 1.50; sil. 2 to 3.	29.25 to 29.75

Ore.—A large movement of foreign ore to the American seaboard is anticipated by local sellers. Recent sales of Swedish ore have been on the basis of 10c. per unit, which makes the delivered cost at eastern Pennsylvania furnaces lower than the price of Lake Superior ore, delivered at nearby points. Some foreign ore is quoted as low as 8½c. per unit, and some as high as 13c. Present indications are that not less than 500,000 tons will come from abroad this year. Recent importations have been largely from Sweden and North Africa. Last week's receipts were 7857 tons, all from Sweden.

Ferromanganese.—The Lavino Furnace Co. has advanced its price to $110, furnace, on domestic ferromanganese, but is not trying to push sales at that figure. The British importers still quote $110, seaboard, but have nothing for delivery for several months.

Semi-Finished Steel.—Open-hearth rerolling billets are firm at a minimum of $42.50, Pittsburgh. A sale of 1500 tons was made at $43.50, Pittsburgh. Forging billets are held at $50, Pittsburgh.

Plates.—The Eastern plate situation grows stronger. One independent mill has sold at 2.35c., Pittsburgh, in the past week, but others are quoting 2.50c. The Bethlehem Steel Co. is temporarily out of the market on plates and shapes. The Carnegie Steel Co. is still quoting 2.25c., Pittsburgh, but its deliveries are months off. From some of the independent mills in the East, plates are to be had for shipment in three or four weeks. The Midvale Steel & Ordnance Co. is this week adding four open-hearth furnaces at Coatesville, making 10 active, and the Lukens Steel Co. will shortly increase its output. The largest buyer in the past week or two is the Pennsylvania Railroad, which has closed for a large tonnage for car repairs and new cars.

Structural Steel.—Sales of structural shapes have been made by an Eastern mill in the past week at 2.25c., Pittsburgh, but this mill, whose capacity is small, took all that it wanted at that figure and withdrew temporarily from the market. Other independents are taking business very sparingly or not at all. Shapes are now quoted from 2.35c. to 2.50c., Pittsburgh, with the higher figure coming each day closer to the governing factor in a majority of transactions.

Bars.—Steel bars are quoted from 2.35c. to 2.50c., Pittsburgh, but 2.35c. is quoted by one or two mills which are taking business only as it fits into their rolling schedules. Small buyers in particular are obliged to pay 2.50c. Some Eastern makers of bar iron have advanced prices and are quoting 2.40c., Pittsburgh, for carload lots and 2.60c. for less than carloads. One company still holds to 2.25c., but is not an active seller.

Sheets.—All grades of sheets are firmer. Blue annealed are being quoted from 2.85c. to 3c. by independent mills; black at 3.60c. or higher, and galvanized at 4.75c. to 5c., all base Pittsburgh. Many mills are not anxious to sell galvanized sheets at less than 5c. and some consumers are paying that price.

Bolts, Nuts and Rivets.—Machine bolts, track bolts, nuts and rivets have been advanced in price by Eastern makers. Track bolts, which were advanced $5 a ton only a week ago, have been put up another $1 and are now being quoted at 4.15c. per lb., Pittsburgh, for ¾-in. and larger; the small sizes remain unchanged at 4.25c. An advance of approximately 10 per cent has been put into effect on machine bolts, carriage bolts, etc., the present discount on large machine bolts, applying to second quarter contracts, being 50 and 10 per cent off list. Hot-pressed and cold-punched nuts are now 3.50c. per lb. off list for blank and 3.25c. per lb. off list for tapped. Boiler rivets were advanced $5 a ton to 3.35c. per lb. and structural rivets are also up $5 to 3.25c. per lb., Pittsburgh. Small rivets are quoted 60 and 5 per cent off list.

Warehouse Business.—In line with recent advances in mill prices, local jobbers have advanced prices of steel products out of stock from $3 to $5 a ton. Present quotations for local delivery are as follows:

Soft steel bars and small shapes, 3.30c.; iron bars (except bands), 3.30c.; round edge iron, 3.50c.; round edge steel, iron finish, 1½ x ½ in., 3.50c.; round edge steel planished, 4.30c.; tank steel plates, ¼-in. and heavier, 3.40c.; tank steel plates, ⅜-in., 3.65c.; blue annealed steel sheets, No. 10 gage, 4.10c.; black sheets, No. 28 gage, 4.90c.; galvanized sheets, No. 28 gage, 6c.; square twisted and deformed steel bars, 3.40c.; structural shapes, 3.40c.; diamond pattern plates, ¼-in., 5.20c.; ⅜-in., 5.40c.; spring steel, 4.80c.; round cold-rolled steel, 4.15c.; squares and hexagons, cold-rolled steel, 4.65c.; steel hoops, 1 in. and wider, No. 20 gage and heavier, 4.50c.; narrower than 1 in., all gages, 5c.; steel bands, No. 12 gage to ⅜-in., inclusive, 4.10c.; rails, 3.30c.; tool steel, 8.50c.; Norway iron, 6.50c.

Old Material.—Sales of 30,000 to 35,000 tons of No. 1 heavy melting steel were made last week at $24, delivered, an advance of $2 a ton within a week. The Bethlehem Steel Co. took 25,000 tons, Midvale Steel & Ordnance Co., 5000 tons, Worth Steel Co., 3000 tons. All would have bought more at the same price, had it been available. The scrap is not to be had, according to dealers and brokers, and the experience of the mills in trying to buy would seem to bear this out. It is stated that steel mills are closer to an actual famine in scrap than they have ever been. In addition to the demand at home, there have been cables from European countries inquiring as to the possibility of importing scrap from the United States, but the high prices here seem to make that out of the question. Other grades are advancing with heavy melting steel. Nearly all grades are up 50c. to $1 a ton.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$24.00 to $25.00
Scrap rails	24.00 to 25.00
Steel rails for rolling	26.00 to 27.00
No. 1 low phos., heavy 0.04 and under	28.00 to 29.00
Cast iron car wheels	26.00 to 27.00
No. 1 railroad wrought	26.00 to 27.00
No. 1 yard wrought	24.00 to 25.00
No. 1 forge fire	20.00 to 21.00
Bundled sheets (for steel works)	20.00 to 21.00
No. 1 busheling	23.00 to 24.00
Mixed borings and turnings for blast furnace use	19.00 to 20.00
Machine shop turnings (for steel works use)	20.00 to 21.00
Machine shop turnings (for rolling mill use)	20.50 to 21.00
Heavy axle turnings (or equivalent)	22.00 to 22.50
Cast borings (for steel works and rolling mills)	20.00 to 21.00
Cast borings (for chemical plants)	22.50 to 25.00
No. 1 cast	27.00 to 28.00
Heavy breakable cast (for steel plants)	24.00 to 25.00
Railroad grate bars	20.50 to 21.00
Stove plate (for steel plant use)	20.50 to 21.00
Railroad malleable	20.00 to 21.00
Wrought iron and soft steel pipes and tubes (new specifications)	20.50 to 21.00
Shafting	25.00 to 26.00
Steel axles (nominal)	25.00 to 30.00

The Pulaski Iron Co., Real Estate Trust Building, Philadelphia, has appointed three agencies to sell its pig iron. Alley & Page, New York and Boston, have the New England territory; Rogers, Brown & Co. are in charge of sales in the territories contiguous to New York and Philadelphia, and the Matthew Addy Co. will cover the Southern States and territory near Cincinnati.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

For additional prices, see page 714

Plates

Sheared, tank quality, base, per lb.....2.25c. to 2.50c.

Structural Material

Beams, channels, etc.....2.25c. to 2.50c.

Iron and Steel Bars

Soft steel bars, base, per lb.....2.25c. to 2.50c.
Refined iron bars, base, per lb..... 2.90c.

Hot-Rolled Flats

Hoops, ordinary gages and widths, base, per lb. 3.05c.
Hoops, light gage, under 1 in. wide.....3.40c. to 3.60c.
Bands, base, per lb..... 3.05c.
Strips, base, per lb..... 3.05c.

Cold-Finished Steels

Bars and shafting, base, per lb..... 2.80c.
Strips, base, per lb.....5.00c. to 5.05c.

Wire Products

Nails, base, per keg.....$2.80 to $3.00
Galvanized nails, 1 in. and over..... 1.50 over base
Galvanized nails, less than 1 in..... 2.00 over base
Bright plain wire, base, No. 9 gage per 100 lb..$2.65 to 2.75
Annealed fence wire, base, per 100 lb..... 2.80 to 2.90
Spring wire, base, per 100 lb..... 3.60
Galvanized wire, No. 9, 10 and 11 base, per 100 lb. 3.25 to 3.35
Galvanized barbed, base, per 100 lb.....3.45c. to 3.70c.
Galvanized staples, base, per keg.....$3.45 to $3.80
Painted barbed wire, base, per 100 lb..... 3.20 to 3.35
Polished staples, base, per keg..... 3.20 to 3.35
Cement coated nails, base, per count keg..... 2.30 to 2.60
Woven fence, carloads (to jobbers) .69 to 66½ per cent off list
Woven fence, carloads (to retailers) .66½ to 64 per cent off list

Bolts and Nuts

Machine bolts, small, rolled threads..50 and 10 per cent off list
Machine bolts, small, cut threads.....50 per cent off list
Machine bolts, larger and longer.....50 per cent off list
Carriage bolts, ⅜ x 6 in.:
Smaller and shorter, rolled threads, 45 and 10 per cent off list
Cut threads .....45 per cent off list
Longer and larger sizes.....45 per cent off list
Lag bolts .....50 and 10 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads.....50 per cent off list
Other style heads.....20 per cent extra
Machine bolts, c.p.c. and t. nuts, ⅜ x 4 in.:
Smaller and shorter.....40 and 5 per cent off list
Larger and longer sizes.....40 and 5 per cent off list
Hot pressed square or hex. blank nuts.....$3.25 off list
Hot pressed nuts, tapped..... 3.00 off list
C.p.c. and t. sq. or hex. nuts, blank..... 3.25 off list
C.p.c. and t. sq. or hex. nuts, tapped..... 3.00 off list
Semi-finished hex. nuts:
⅞ in. and smaller, U. S. S.....75 and 5 per cent off list
⅞ in. and larger, U. S. S.....70 and 2½ per cent off list
Small sizes, S. A. E.....75, 10 and 5 per cent off list
S. A. E., ⅝ in. and larger....75, 10 and 2½ per cent off list
Stove bolts in packages.....80 and 5 per cent off list
Stove bolts in bulk.....80, 5 and 2½ per cent off list
Tire Bolts .....50, 10 and 10 per cent off list

Cap and Set Screws

Milled square and hex. head cap screws.....75 per cent off list
Milled set screws.....75 per cent off list
Upset cap screws.....75 and 10 per cent off list
Upset set screws.....80 per cent off list

Rivets

Large structural and ship rivets, base, per 100 lb. .....$3.00 to $3.25
Large boiler rivets, base, per 100 lb..... 3.10 to 3.35
Small rivets .....65 and 5 to 60 and 5 off list

Track Equipment

Spikes, 9/16 in. and larger, base, per 100 lb.....$3.05 to $3.15
Spikes, ½ in., 7/16 in. and ⅜ in., per 100 lb.... 3.65 to 3.75
Spikes, 5/16 in..... 3.75
Spikes, boat and barge, base, per 100 lb..... 3.50
Track bolts, ¾ in. and larger, base, per 100 lb.. 4.25 to 4.75
Track bolts, ½ in. and ⅝ in., base, per 100 lb.. 5.00 to 5.50
Tie plates, per 100 lb..... 2.55 to 2.60
Angle bars, base, per 100 lb..... 2.75

Welded Pipe

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛	47	21½	⅛ to ⅜.....	+11	+39
¼ to ⅜.....	53	27½	½	22	2
½	58	44½	¾	28	11
¾	62	50½	1 to 1½.....	30	13
1 to 3.....	64	52½			

Lap Weld

2	57	45½	2	23	7
2½ to 6.....	61	49½	2½	26	11
7 to 8.....	58	45½	3 to 6.....	28	13
9 to 12.....	57	44½	7 to 12.....	26	11

Butt Weld, extra strong, plain ends

⅛	43	26½	¼ to ⅜.....+19		+54
¼ to ⅜.....	49	32½	½	21	7
½	55	44½	¾	28	12
¾	60	49½	1 to 1½.....	30	14
1 to 1½.....	62	51½			
2 to 3.....	63	52½			

Lap Weld, extra strong, plain ends

2	55	44½	2	23	9
2½ to 4.....	59	48½	2½ to 4.....	29	15
4½ to 6.....	58	47½	4½ to 6.....	28	14
7 to 8.....	54	41½	7 to 8.....	21	7
9 to 12.....	48	35½	9 to 12.....	16	2

To the large jobbing trade the above discounts are increased by one point, with supplementary discount of 5 per cent, on black and 1½ points, with a supplementary discount of 5 per cent, on galvanized.

Boiler Tubes

Lap Welded Steel		*Charcoal Iron*	
1⅝ in.	21½	1½ in. .....+12	
2 to 2¼ in.....	33	1¾ to 1⅞ in.....+ 2	
2½ to 3 in.....	44	2 to 2¼ in.....— 8	
3¼ to 13 in.....	49	2½ to 3 in.....—13	
		3¼ to 4½ in.....—15	

To large buyers of steel tubes a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

Discounts on cold-drawn tubes in carload lots, f.o.b. Pittsburgh, follow:

1 in.	55	2½ and 2¾ in.	35
1¼ and 1½ in.	47	3 in.	39
1¾ in.	31	3¼ to 4 in.	44
2 and 2¼ in.	31	4¼ in. and 5 in.	36

Hot Rolled

3 in.	41	3¼ to 4 in.	46

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be sold at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Carbon under 0.30, base.....85 per cent off list
Carbon 0.30 to 0.40, base.....83 per cent off list
Plus usual differentials and extras for cutting.

Seamless Locomotive and Superheater Tubes

	Cents per Ft.		Cents per Ft.
2-in. O.D. 12 gage.....	14	2¼-in. O.D. 10 gage...	19
2-in. O.D. 11 gage.....	15	3-in. O.D. 7 gage...	34
2-in. O.D. 10 gage.....	16	1½-in. O.D. 9 gage...	13⅝
2¼-in. O.D. 12 gage...	16	5⅜-in. O.D. 9 gage...	53
2¼-in. O.D. 11 gage...	17	5½-in. O.D. 9 gage...	55

Tin Plate

Standard cokes, per base box.....$4.95 to $5.10

Terne Plate

(Per package, 20 x 28 in.)

8-lb. coating, per 100 lb. base .....$ 9.90		20-lb. coating I. C.....$13.80	
8-lb. coating I. C.....	10.20	25-lb. coating I. C.....	15.10
12-lb. coating I. C.....	11.60	30-lb. coating I. C.....	16.25
15-lb. coating I. C.....	12.70	35-lb. Coating I. C.....	17.25
		40-lb. Coating I. C.....	18.25

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb.....2.65c. to 3c.

Box Annealed, One Pass Cold Rolled

No. 28 (base), per lb.....3.50c. to 3.75c.

Automobile Sheets

Regular auto body sheets, base (22 gage), per lb..5c. to 5.50c.

Galvanized

No. 28 (base), per lb.....4.60c. to 4.75c.

Tin-Mill Black Plate

No. 28 (base), per lb.....3.50c. to 3.75c.

Manufacturers have pamphlets, which can be had upon application, giving price differentials for gage and extras for length, width, shearing, etc.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic.	$0.325	Buffalo	$0.265	St. Louis.....	$0.43
Philadelphia, export..	0.235	Cleveland	0.215	Kansas City	0.735
Baltimore, domestic...	0.315	Cleveland, Youngstown		Kansas City (pipe)...	0.705
Baltimore, export.....	0.225	Comb.	0.19	St. Paul	0.60
New York, domestic...	0.34	Detroit	0.29	Omaha	0.735
New York, export.....	0.255	Cincinnati	0.29	Omaha (pipe)	0.705
Boston, domestic.....	0.365	Indianapolis	0.31	Denver	1.27
Boston, export.....	0.255	Chicago	0.34	Denver (pipe)	1.215
				Pacific Coast	$1.50
				Pac. Coast, ship plates	1.20
				Birmingham	0.69
				Memphis	0.385
				Jacksonville, all rail..	0.50
				Jacksonville, rail and water	0.415
				New Orleans	0.515

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lbs., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i. e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 30c. to 40c.; ship plates, 30c. to 40c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 30c. to 40c.; sheets and tin plates, 30c. to 40c.; rods, wire rope cable and strands, 75c.; wire fencing, netting and stretcher, 50c.; pipe not over 8 in. in diameter, 50c.; over 8 in. in diameter, 2½c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Prices of Raw Materials, Semi-Finished and Finished Products

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Old range Bessemer, 55 per cent iron	$5.95
Old range non-Bessemer, 51½ per cent iron	5.20
Mesabi Bessemer, 55 per cent iron	5.70
Mesabi non-Bessemer, 51½ per cent iron	5.05

Foreign Ore, per Unit, c.i.f. Philadelphia or Baltimore

Iron ore, low phos., 55 to 58 per cent iron in dry Spanish or Algerian	11.50c.
Iron ore, Swedish, average 66 per cent iron	9.5c. to 10c.
Manganese ore, washed, 51 per cent manganese, from the Caucasus	37c.
Manganese ore, ordinary, 48 per cent manganese, from the Caucasus	35c.
Manganese ore, Brazilian or Indian	33c. to 34c.
Tungsten ore, per unit, in 60 per cent concentrates, nominal	$7.50 to $8.50
Chrome ore, basic 48 per cent Cr_2O_3, crude per ton, c.i.f. Atlantic seaboard	18.00 to 28.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	60c. to 70c.

Ferroalloys

Ferromanganese, domestic, 80 per cent, furnace per ton	$110.00
Ferromanganese, British, 80 per cent, f.o.b. Atlantic port, duty paid	110.00
Spiegeleisen, domestic 19 to 21 per cent, furnace per ton	$35.00 to 37.00
Spiegeleisen, domestic 16 to 19 per cent, furnace per ton	34.00 to 36.00
Ferrosilicon, 50 per cent, delivered per gross ton	87.50 to 90.00
Ferrosilicon, Bessemer, 10 per cent, per ton furnace	45.50
Ferrotungsten, per lb. contained metal	90c. to 95c.
Ferrochromium, 4 to 8 per cent carbon, 60 to 70 per cent Cr. per lb. contained Cr. delivered	12c. to 14c.
Ferrovanadium, per lb. contained vanadium	$3.50 to $4.00
Ferrocarbontitanium, 15 to 18 per cent, per net ton	200.00

Fluxes and Refractories

Fluorspar, 80 per cent and over calcium fluoride, not over 5 per cent silica per net ton f.o.b. Illinois and Kentucky mines	$20.00
Fluorspar, 85 per cent and over calcium fluoride, not over 5 per cent silica per net ton, f.o.b. Illinois and Kentucky mines	21.50

Per 1000 f.o.b. works:

Fire Clay:	High Duty	Moderate Duty
Pennsylvania	$43.00 to $46.00	$38.00 to $41.00
Ohio	40.00 to 42.00	35.00 to 38.00
Kentucky	40.00 to 42.00	37.00 to 40.00
Illinois	43.00 to 45.00	40.00 to 42.00
Missouri	48.00 to 50.00	38.00 to 43.00
Ground fire clay, per net ton	7.50 to	5.50 to 8.00
Silica Brick:		
Pennsylvania		42.00
Chicago		50.00
Birmingham		48.00
Ground silica clay, per net ton		9.50
Magnesite Brick:		
Standard size, per net ton (f.o.b. Baltimore and Chester, Pa.)		65.00
Grain magnesite, per net ton (f.o.b. Baltimore and Chester, Pa.)		40.00
Chrome Brick:		
Standard size, per net ton		50.00

Semi-Finished Steel, f.o.b. Pittsburgh or Youngstown, per gross ton

Rolling billets, 4-in. and over	$42.50
Rolling billets, 2-in. and under	42.50
Forging billets, ordinary carbons	50.00
Sheet bars, Bessemer	42.50
Sheet bars, open hearth	42.50
Slabs	42.50
Wire rods, common, soft base, No. 5	47.00 to 50.00
Wire rods screw stock	$5 per ton over base
Wire rods carbon 0.20 to 0.40	$3 per ton over base
Wire rods carbon 0.41 to 0.55	$5 per ton over base
Wire rods, carbon 0.56 to 0.75	$7.50 per ton over base
Wire rods, carbon over 0.75	$10 per ton over base
Wire rods, acid	$15 per ton over base
Skelp, grooved, per lb	2.25c. to 2.50c.
Skelp, sheared, per lb	2.25c. to 2.50c.
Skelp, universal, per lb	2.25c. to 2.50c.

Finished Iron and Steel, f.o.b. Mill

Rails, heavy, per gross ton	$43.00
Rails, light, new steel, base, per lb	2.15c. to 2.25c.
Rails, light, rerolled, base, per lb	2c. to 2.10c.
Spikes, $\frac{5}{16}$-in. and larger, base, per 100 lb	$3.15
Spikes, ½-in., $\frac{7}{16}$-in. and ⅜-in., base, per 100 lb	3.75
Spikes, $\frac{9}{16}$-in., base, per 100 lb	3.75
Spikes, boat and barge, base, per 100 lb	3.50
Track bolts, ⅝-in. and smaller, base, per 100 lb	$5.00 to 5.50
Track bolts, ¾-in. and larger, base, per 100 lb	4.00 to 4.50
Tie plates, per 100 lb	2.55 to 2.60
Angle bars, per 100 lb	2.75
Bars, common iron, base, per lb	2.50c. to 2.60c.
Bars, rail, steel reinforcing, base, per lb	2.15c. to 2.25c.
Ground shafting, base, per lb	3.20c.
Cut nails, base, per keg	$3.15

Alloy Steel

S.A.E. Series Numbers	Bars 100 lb.
2100 (1½% Nickel, 10 to 20 per cent Carbon)	$3.25
2300 (3½% Nickel)	5.50
2500 (5% Nickel)	$8.00 to 8.25
3100 (Nickel Chromium)	4.50
3200 (Nickel Chromium)	6.25
3300 (Nickel Chromium)	8.50
3400 (Nickel Chromium)	7.50
5100 (Chromium Steel)	4.00
5200 (Chromium Steel)	7.25
6100 (Chromium Vanadium bars)	5.25
6100 (Chromium Vanadium spring steel)	5.00
9250 (Silico Manganese spring steel)	4.15
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chromium, 0.15 Vanadium)	5.25
Chromium Molybdenum bars (0.70-1 Chromium, 0.25—0.40 Molybdenum)	5.25
Chromium Molybdenum spring steel (0.50—0.70 Chromium, 0.15—0.25 Molybdenum)	5.00

Above prices are for hot-rolled alloy steel bars, forging quality, per 100-lb. f.o.b. Pittsburgh. Billets 4 x 4 in. and larger are $10 per gross ton less than net ton price for bars of same analyses. On smaller than 4 x 4-in. billets down to and including 2½-in. sq. there is a size extra of $10 per gross ton; on billets smaller than 2½-in. sq. the net ton bar price applies.

Steel Furniture Shipments Increasing

Shipments of steel-furniture stock goods by manufacturers showed continued growth throughout 1922, according to figures published by the Department of Commerce from a compilation by the Bureau of the Census in cooperation with the National Association of Steel Furniture Manufacturers. The shipments in December, 1922, were the largest in over two years. January shipments were only one per cent less than December and amounted to $1,362,470.

Statistics from 22 manufacturers, comprising practically the total output of steel-furniture stock goods, show that the year 1922, with total shipments of $12,928,026, was the second best year since the war, being exceeded only by the record $17,659,303 shipments of 1920. The largest shipments occurred in September, 1920, with a total of $1,730,393, while the lowest record was in June, 1919, at $690,855. There has been a steady increase each month since August, 1922, in these shipments which include sections, counters, office and vault verticals, safes and interiors, desks and tables and small miscellaneous articles, exclusive of shelving and lockers.

The following table gives the value of the monthly shipments of steel-furniture stock goods since January, 1919:

Shipments of Steel-Furniture Stock Goods

	1919	1920	1921	1922
January	$812,121	$1,254,912	$1,136,500	$983,834
February	707,634	1,195,233	1,078,336	967,125
March	743,747	1,513,014	996,194	1,087,228
April	781,252	1,095,080	994,339	1,058,382
May	816,414	1,603,868	1,018,189	1,056,735
June	690,855	1,673,422	922,318	1,015,463
July	731,578	1,534,995	817,829	945,768
August	958,114	1,718,657	793,281	943,087
September	1,088,685	1,730,393	782,053	1,062,495
October	1,057,871	1,721,812	871,012	1,227,447
November	1,119,280	1,360,638	890,362	1,204,310
December	1,387,652	1,257,279	1,027,417	1,376,152
Total	$10,895,203	$17,659,303	$11,327,830	$12,928,026

January, 1923, shipments were $1,362,470.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Straits Tin	Lead		Zinc	
Feb.	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis
28.....	16.87½	16.50	46.62½	8.30	8.30	7.97½	7.62½
March							
1.....	17.00	16.62½	46.75	8.35	8.35	8.02½	7.67½
2.....	17.12½	16.62½	46.20	8.50	8.40	8.10	7.75
3.....	17.12½	16.62½	....	8.50	8.40	8.20	7.85
5.....	17.25	16.75	46.75	8.62½	8.45	8.20	7.85
6.....	17.25	16.75	47.37½	8.62½	8.45	8.25	7.90

*Refinery quotation; delivered price ¼c. higher.

New York

NEW YORK, March 6.

Heavy demand and higher prices continue to feature all the markets. A new high has been registered for copper, and tin has continued to advance. Lead prices have sharply risen and zinc has continued its upward trend.

Copper.—Another week of large demand and advancing prices has been registered in the copper market. Electrolytic copper for all positions, including May and June, is firm at a minimum of 17c., delivered. As was the case a week ago, some producers are asking ⅛c., higher or have withdrawn from the market. The buying is stated to have been representative, and it is also claimed that all consumers have not yet fully covered their requirements. While foreign demand is still good, domestic demand exceeds it. Lake copper is also selling at higher levels and is quoted at a minimum of 17.25c., delivered.

Copper Averages.—The average price of Lake copper for the month of February, based on daily quotations in THE IRON AGE, was 15.65c., New York. The average price of electrolytic copper was 15.33½c., refinery, or 15.58½c., delivered.

Tin.—Fair sales of Straits tin have been made each day and advances in price have been almost a daily occurrence. The most active day in the week covered by this report was the sale of not less than 500 tons on Feb. 27. March delivery was sold at 44.75c., with May-June shipment from the East bringing 45c. and March-April-May delivery 44.75c. On Feb. 28 sales of March-April and May-June shipment from the East went at 46.62½c. to 46.75c. After a dull day on Thursday, March 1, fair activity pervaded the market March 2 when good sales were made. These comprised principally December-January shipment from the East at 46c., May-June shipment from the East at 46.12½c. and spot metal at 46.12½c., also. There were also sales to consumers in the interior at 46.12½c. to 46.37½c. Sales on Saturday amounted to 100 to 150 tons and yesterday to about 250 tons for various positions at 46.75c. The big feature of the entire market is the very heavy consumption. Statistics for the month of February show deliveries for the month to have been 6185 tons, with 2054 tons in stock and landing on Feb. 28. Imports for the month were only 4885 tons. Arrivals thus far this month have been 2300 tons, with 9446 tons reported afloat. London prices today were about £10 per ton higher than a week ago, with spot standard quoted at £211 15s., future standard at £212 15s. and spot Straits at £219 15s. Spot Straits tin in this market was quoted today at 47.37½c., New York, or the highest price since August, 1920, when the average for the month was 47.60c.

Lead.—The market has assumed new strength as far as prices are concerned. Lead is hard to get except at fancy prices and not much can be obtained then. Within the week the leading interest has advanced its price twice, on March 1 to 8.15c., New York, and on March 2 to 8.25c., New York. In the outside market a fair appraisal is 8.62½c., New York, and 8.45c., St. Louis, at which levels actual business has been done. There is considerable talk of 8.50c. as the St. Louis price, but business thus far has been done just under this.

Zinc.—The quotations for prime Western continue to advance, and new high levels on this movement have been registered. Prompt and March delivery is very difficult to obtain, but carload and small lots have been sold at 7.90c., St. Louis, and 8.25c., New York, which are largely nominal quotations. These values are the highest since August, 1920. For April delivery, which position is also somewhat scarce, the quotation is 7.80c. to 7.85c., St. Louis, or 8.15c. to 8.20c., New York. The strength of the market is due more to the sold up condition of producers than to demand which at present is very quiet; both for domestic consumption and for export.

Antimony.—Spot and early delivery metal in wholesale lots is difficult to obtain and is quoted considerably higher at 8.75c., per lb., New York, duty paid.

Aluminum.—Virgin metal, 98 to 99 per cent pure in wholesale lots for early delivery is quoted at 24.50c. to 25c. per lb., New York, duty paid, by importers of the foreign product, but some of these have received instructions not to sell. Quotations by the leading producer are not made public.

Old Material.—The market continues strong and business is active. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	16.25
Copper, heavy and wire	14.75
Copper, light and bottoms	12.50
Heavy machine composition	13.00
Brass, heavy	10.00
Brass, light	7.75
No. 1 red brass or composition turnings	11.50
No. 1 yellow rod brass turnings	9.00
Lead, heavy	7.50
Lead, tea	6.25
Zinc	5.00

Chicago

March 6.—Prices of all the metals have advanced and the market is exceedingly strong, with business heavy except in zinc. Producers of copper refuse to quote for future deliveries, notwithstanding a heavy demand and a continued advance of this metal is expected. On the other hand, tin has reached such a high level that buyers are reducing their purchases. We quote, in carload lots, lake copper, 17.25c.; tin, 48.50c.; lead, 8.60c.; spelter, 7.95c.; antimony, 10c., in less than carload lots. On old metals we quote copper wire, crucible shapes and copper clips, 14c.; copper bottoms, 12c.; red brass, 11.50c.; yellow brass, 8.50c.; lead pipe, 7c.; zinc, 5c.; pewter, No. 1, 25c.; tin foil, 27c.; block tin, 35c.; all buying prices for less than carload lots.

St. Louis

March 6.—Lead was firm and 20 points higher for the week, while slab zinc was firm and 25 points higher. We quote carlots: Lead, 8.35c. to 8.40c.; slab zinc, 7.70c. to 7.75c. On old metals we quote: light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 3c.; lead, 3c.; pewter, 15c. tin foil, 20c.; aluminum, 9c.

The Clyde Iron Works, Duluth, Minn., has joined forces with the Willamette Iron & Steel Works, Portland, Ore., in the formation of the Willamette-Clyde Co. for the purpose of developing and marketing logging machinery on the Pacific Coast. No merger has been effected, but the new corporation is owned equally by the officers of both corporations. The new organization will have headquarters at Portland.

E. J. Lowry, metallurgist, Hickman, Williams & Co., will deliver an address on the "Relativity of Chemical Elements and Mixtures in High Strength Iron" at a meeting of the Chicago Foundrymen's Club at the City Club, Chicago, Saturday evening, March 10. Ten charts will be exhibited to illustrate the lecture.

British Iron and Steel Market

Pig Iron and Finished Steel Advance Sharply on Higher Cost—Tin Plate and Sheets Strong—Continental Markets Dead

(By Cable)

LONDON, ENGLAND, March 6.

Pig iron is strong on increasing costs. More Cleveland furnaces have been relighted for steel plant use, but the general market supplies still are scarce. The Continent is buying fair quantities of Scotch foundry iron at £6 ($28.20) f.o.b. Cleveland makers are sold out to the end of May. Hematite is firm, with an upward tendency.

Foreign ore is firm. Sellers of best Bilbao Rubio ask 25½s. ($6.11) c.i.f. Tees.

Steel prices generally are 5s. ($1.18) higher, but buyers are not yet keen to follow the rise and sales have diminished, especially for export. The Far Eastern demand is maintained.

Clyde output of ships for February was 18,846 tons, gross register.

Armstrong, Whitworth & Co. has secured important rail orders from India.

Continental position is unaltered. Deliveries continue from works possessing their own coke plants. Others generally are partially if not entirely closed down. Belgian merchant bars are being sold at £9 5s. (1.94c. per lb.) f.o.b., for April and May delivery.

Luxemburg is approaching complete cessation of output. Longwy, at the end of February, had 17 furnaces blowing out of 54; Nancy, 9 furnaces out of 27; Lorraine, 14 furnaces out of 66.

Tin plate bars have been advanced 10s. ($2.35) for sales up to July 31, but orders must be placed by March 13. Tin plate is strong. Minimum prices have been advanced 1½s. (35c.) basis to 22½s. ($5.29) basis IC f.o.b. Some sellers are asking higher figures.

Galvanized sheets are firm, with moderate business passing.

Black sheets are strong. Far Eastern specifications have been sold up to £20 (4.20c. per lb.) f.o.b., for July and August delivery.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at $4.70 per £1, as follows:

Durham coke, delivered	£1	18½s.	to	£2	0s.	$9.05	to	$9.40
Cleveland No. 1 foundry	6	10†				30.55		
Cleveland No. 3 foundry	6	5				29.38		
Cleveland No. 4 foundry	6	0	to	6	2½	28.20	to	28.79
Cleveland No. 4 forge	5	17½				27.61		
Cleveland basic	6	2½				28.79		
East Coast mixed	6	2½	to	7	0	28.79	to	32.90
Ferromanganese	16	0				75.20		
Ferromanganese*	16	0				75.20		
Rails, 60 lb. and up	8	15	to	9	0	41.13	to	42.30
Billets	8	0	to	9	0	37.60	to	42.30
Sheet and tin plate bars, Welsh	8	16				41.24		
Tin plates, base box	1	2½	to	1	3½	5.29	to	5.52
						C. per Lb.		
Ship plates	9	5	to	9	15	1.94	to	2.05
Boiler plates	11	10	to	12	10	2.41	to	2.62
Tees	10	5	to	10	15	2.15	to	2.26
Channels	9	10	to	10	0	1.99	to	2.10
Beams	9	5	to	9	15	1.94	to	2.05
Round bars, ¾ to 3 in.	10	15	to	11	5	2.26	to	2.36
Galvanized sheets, 24 g.	19	0	to	19	5	3.99	to	4.04
Black sheets, 24 gage	13	10				2.83		
Black sheets, Japanese specifications	15	5				3.20		
Steel hoops	11	0	&	12	10*	2.31	&	2.62*
Cold rolled steel strip, 20 g.	23	0				4.83		
Cotton ties, Indian specifications	15	0				3.15		

*Export price. †Nominal.

Continental Prices, All F. O. B. Channel Ports, Delivery as Specified

Merchant bars:			C. per Lb.	
Belgium, April, May	£8 15s.	to £10 15s.	1.84	to 2.26

No other quotations.

Increasing Costs Hamper Free Market—Japan Buying Electrical Equipment

LONDON, Feb. 22.—The markets for iron and steel continue to show considerable strength, and it is difficult to see exactly what will be the final outcome. With costs increasing, iron producers naturally cannot see their way to making any substantial increase in the output and as a result supplies of pig iron are becoming scarce and commanding high figures. There has been a strong demand from the Continent, both for fuel and pig iron and, as far as Cleveland grades are concerned, iron masters are fully sold for the next two months and for shipment beyond that date are little inclined to quote. A fair amount of home business has also been moving, but prices are now reaching a level at which home consumers are inclined to hesitate.

Durham blast furnace coke has been fetching as much as 60s., f.o.b., for export, while home consumers have to pay 34s., which in turn means a substantial increase in the price of pig iron. With so few prompt or early supplies available, high figures are being realized when any spot parcel is offered, and business was done this week in No. 1 Cleveland at 120s., while No. 3 fetched as much as 117s. 6d. No. 4 foundry changed hands at 112s. 6d., but there is no price named for No. 4 forge. The demand for hematite expands, but the position of supplies of this material is not so acute as is the case of foundry grades, and a little can be obtained for early shipment; but for forward contracts makers are not keen to commit themselves. Sales of East Coast mixed numbers have been made at up to 110s., and it is anticipated that prices will be advanced still further; indeed, some makers have already taken this step. Orders have been booked for parts of the Continent and for America, but only on a moderate scale.

The trend of prices of manufactured iron and steel is continually upward, and extraordinary figures are being asked now in some departments. During the past week a lot of business has been placed by home consumers, more especially constructional engineers, who have bought angles, joists and sections, and while the demand for plates is not so persistent, the prices quoted for the former are now practically on the same level as those asked for the latter. A feature of the export trade has been a large demand for all kinds of material for shipment to Germany, but makers are rather chary of booking these orders, and at the time of writing no substantial business had accrued. India is inquiring in good volume, but the specifications required are mainly those which in the ordinary run of things were placed with Continental works, as British manufacturers were not in a position to roll them.

It is interesting to note that Japan has once more turned to British material, apart from sheets, etc., a large electrical order for the Japan Electric Light Co. having been secured by the Metropolitan-Vickers Electric Co. It is stated that this is the first time that a Japanese order of this kind has been placed outside the United States.

Steel Club of Philadelphia Dinner

The Steel Club of Philadelphia, an organization of district sales managers of steel companies, whose motto is "Good Fellowship is Life," gave its annual dinner at the Bellevue-Stratford Hotel, Philadelphia, Friday evening, March 2, and entertained many of its friends. The total attendance was about 150. H. S. Moore, district sales manager of the Central Iron & Steel Co., Harrisburg, Pa., who is president of the club, was toastmaster and called on just one speaker, State Senator Fletcher W. Stites of Montgomery County. A jazz orchestra and a preliminary showing of Harold Lloyd's latest picture, "Safety Last," were other features of the entertainment. Samuel W. Hilt of the Pennsylvania Steel Export Co. and L. V. Geist of the Donner Steel Co.'s Philadelphia office made it unnecessary for the club to look elsewhere for vocal talent.

FABRICATED STEEL BUSINESS

Awards of About 15,000 Tons and Inquiries for About 27,000 Tons

Structural steel activity this week relates more to inquiries than to lettings, for the reason that mills are filled up and unable to give satisfactory delivery promises. Therefore, it is more difficult for prospective builders to complete their contracts.

Fabricated steel work awarded in the past week includes the following:

Addition to Hotel Albert, New York, 200 tons, to Levering & Garrigues Co.

Highway bridge at Massena, N. Y., 1000 tons, to Phoenix Bridge Co.

American Locomotive Co. building at Paterson, N. J., 400 tons, to American Bridge Co.

Elks' Club, Newark, N. J., 1500 tons, to Hedden Iron Construction Co.

Railroad shops for Pere Marquette, Grand Rapids, Mich., 2243 tons, to Whitehead & Kales.

Arcade building, Los Angeles, 1400 tons, to Llewellyn Iron Works.

St. Louis-San Francisco Railway, through riveted and deck girder spans, 1144 tons, to American Bridge Co.

St. Louis-San Francisco Railway, bridge, Tulsa, Okla., 779 tons, to American Bridge Co.

Commonwealth Steel Co., buildings, Granite City, Ill., 650 tons divided between St. Louis Structural Steel Co. and Stupp Brothers Bridge & Iron Co.

Athletic Club Building, Dallas, Tex., 590 tons, general contract to Central Contracting Co., which will place order with a Southern fabricator.

Chicago, St. Paul, Minneapolis & Omaha Railway, 1923, bridge betterments, Minnesota and Wisconsin, 297 tons, to American Bridge Co.

Coal bin for R. N. Beaumont Co., Strauss, Kan., 200 tons, to St. Louis Structural Steel Co.

Furnace for Michigan Steel Corporation, Detroit, 125 tons, to Jones & Laughlin Steel Corporation.

Furnace bindings for Ashland works American Rolling Mill Co., 125 tons, to Jones & Laughlin Steel Corporation.

Factory, Williamson Heater Co., Cincinnati, 300 tons, to H. K. Ferguson Co.

Wolfe-Wild department store, Lexington, Ky., 125 tons, to E. M. Grainger Co.

State highway bridge at Black River Falls, Wis., 350 tons, and complete contract to Wausau, Wis., Iron Works. Price, $82,300.

Yeast house for Milwaukee Vinegar Co., 100 tons, to Worden-Allen Co.

National Lamp Works, Cleveland, factory, 425 tons, to McClintic-Marshall Co.

Atlas Savings & Loan Co., Cleveland, bank building, 250 tons, to Riverside Bridge Works.

Ingram Richardson Mfg. Co., Bayonne, N. J., factory, 300 tons, to Fagan Iron Works.

Medical Center Building, Cleveland, 350 tons, to Forest City Steel & Iron Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

Apartment building, Fifty-seventh Street, New York, 800 tons.

Apartment building for Bing & Bing, New York, 1000 tons.

Apartment building, Seventy-fourth Street, New York, 500 tons.

Salaam Temple, Newark, N. J., 1500 tons; figured on some months ago and now up for new bids.

Maine Central Railroad bridge, 1200 tons.

Bank building for Rumford Falls Trust Co., Rumford, Me., 400 tons.

Elks' building, Philadelphia, 2500 tons.

Long Island Railroad bridges for grade elimination work at Jamaica, Long Island, 5200 tons.

High school building at Cortland, N. Y., 300 tons.

Elks' building, Passaic, N. J., 400 tons.

Grain elevator for Baltimore & Ohio Railroad at Baltimore, 2400 tons.

Young Men's and Young Women's Hebrew Association building, Philadelphia, 1200 tons.

Pennsylvania Railroad, poles for electrification of road, 350 tons.

Canton Co., Baltimore, warehouse, 800 tons.

Elks' Club building, Indianapolis, 1000 tons.

Fair Store, sub-basement addition, Chicago, 3000 tons.

Milwaukee Elks' club house, 2500 tons, bids close March 19.

Additional stories on Broadway Exchange, Wisconsin Telephone Co., Milwaukee, 1000 tons.

Screen house for Jones Island sewage disposal plant, Milwaukee, 100 tons. Bids close March 9.

Apartment hotel, Cincinnati, tonnage unstated, bids to be taken shortly.

Bridge work for Big Four Railroad at Indianapolis, 600 tons, bids being taken.

Foundation work for Louisville & Nashville Railroad, 100 tons, bids being taken.

Radio tower at Biddeford, Me., 650 tons.

Four bridges, one for the Louisville & Nashville Railroad at Evansville, Ind; one for the Big Four at Indianapolis, and two for the Toledo Terminal Railroad, Toledo, aggregating 1000 tons.

RAILROAD EQUIPMENT BUYING

Renewed Activity in Buying of Locomotives and Freight Cars in Past Week

The railroads have come into the market again the past week with large purchases of locomotives and cars, particularly the former. A total of 437 engines was placed by various roads with the two largest builders. The largest buyers were the Southern Railway, which ordered 66. The Southern also bought 4000 cars. Inquiries from two roads, the Louisville & Nashville and the Erie, total 12,000 cars.

The Southern Railway has placed an order with the American Locomotive Co. for 50 Mikado type and 16 Pacific type locomotives.

The Louisville & Nashville Railroad has ordered 30 Mikado type and 6 Pacific type locomotives from the American Locomotive Co.

The Boston & Maine Railroad has contracted with the American Locomotive Co. for 10 Pacific type and 10 Santa Fe type locomotives.

The Ann Arbor Railroad has ordered 3 Mikado type locomotives from the American Locomotive Co.

The New York Central (Indiana Harbor Belt Railroad) has ordered 10 Mikado type locomotives from the American Locomotive Works.

The Elgin, Joliet & Eastern Railroad has ordered 10 Mikado type locomotives from the American Locomotive Co.

The New York, Ontario & Western Railroad has ordered 6 mountain type locomotives from the American Locomotive Co.

The New York Central (Pittsburgh & Lake Erie) has ordered 10 Mikado type locomotives from the American Locomotive Co.

The Baltimore & Ohio Railroad has ordered 50 locomotives from the Baldwin Locomotive Works.

The Argentine State Railways have ordered 25 locomotives from the Baldwin Locomotive Works.

The Philadelphia & Reading Railroad has ordered 25 locomotives from the Baldwin Locomotive Works.

The New York Central and the Boston & Albany have ordered 25 steel coaches from the Osgood Bradley Car Co.

The Hillman Coal & Coke Co. recently bought 300 65-ton cars from the Standard Steel Car Co.

The Erie Railroad is in the market for 4000 cars—2000 70-ton hopper cars and 2000 40-ton composite box cars.

The inquiry of the Louisville & Nashville Railroad for 8000 cars has been issued. Bids are asked for on 4000 55-ton hoppers, 2000 55-ton composite gondolas and 2000 box cars.

The Pennsylvania Railroad, which is building a large number of freight cars in its own shops, has inquired from car builders for pressed steel parts requiring about 9000 to 10,000 tons of steel.

The Southern Railway has bought 4000 cars, of which 1500 55-ton composite hopper cars were awarded to the Standard Steel Car Co.; 1000 box cars to the Standard Steel Car Co., and 1500 box cars to the American Car & Foundry Co. The Southern will probably also build a considerable number of cars at its own plant, the Lenoir Car Works.

Fewer freight cars were in need of repair on Feb. 15 than at any time during the last two years, according to reports filed by the carriers with the car service division of the American Railway Association. On that date 206,585, or 9.1 per cent, of the cars on line were in need of repair. This was a decrease since Feb. 1 last of 2,886. Freight cars in need of heavy repair on Feb. 15 numbered 153,541.

The Baltimore & Ohio is inquiring for rebuilding and putting new bodies on 2000 coke cars.

The Southern Pacific has placed six Pacific type, 10 Mountain type and 34 Santa Fe type locomotives with the Baldwin Locomotive Works.

The Atlantic Coast Line has placed 50 engines with the Baldwin Locomotive Works.

The Philadelphia & Reading has ordered 25 consolidated type locomotives from the Baldwin Locomotive Works.

The Chilean State Railways have placed 25 engines with the Baldwin Locomotive Works.

The Chesapeake & Ohio is about to place 25 simple Mallet type engines with the American Locomotive Co.

The Seaboard Air Line is in the market for 25 to 30 Mikado type locomotives.

The Sorocabana Railroad, Brazil, is inquiring for 10 Mikado type engines.

The Monon Route is inquiring for six 8-wheel switch engines.

The Cleveland Electric Illuminating Co. has awarded one locomotive to the American Locomotive Co.

The Pennsylvania has let repairs on 500 engines to the Baldwin Locomotive Works.

The Southern has placed five dining cars with the Pullman Co.

The Montana, Wyoming & Southern has placed 25 freight cars with the Mt. Vernon Car Manufacturing Co.

The Texas Co. is inquiring for 500 tank cars.

The Derby Oil Co. has ordered 25 tank cars from the Standard Tank Car Co.

The Canadian Pacific let 300 gondola cars to the Canadian Car & Foundry Co.; 300 flat cars to the Eastern Car Co.; 12 baggage and mail and six cafe and six buffet cars to the Canadian Car & Foundry Co., and will build 300 flat cars in its own shop.

PERSONAL

Richard Peters, Jr., for the past two years sales manager of the Pulaski Iron Co., Real Estate Trust Building, Philadelphia, has accepted a partnership in Robert C. Lea & Co., Stephen Girard Building, Philadelphia. Rowland E. Lea also becomes a partner in the business, which has heretofore been conducted individually by Robert C. Lea trading as Robert C. Lea & Co. The firm represents the Robesonia Iron Co., maker of copper bearing low phosphorus iron and foundry iron.

R. Edson Emery, recently elected a director, Superior Steel Corporation, Pittsburgh, was elected president of the company at a meeting of the directors in New York March 5, succeeding James H. Hammond, who was elected chairman of the board. Charles H. Forster was elected treasurer, C. D. Clancy secretary, and D. G. Liddell asistant secretary and treasurer. The new president has been identified with the steel industry for the past 22 years and until recently had been manager of the Pittsburgh mills, Crucible Steel Co. of America. Previously he had been manager LaBelle works, Pittsburgh, and the Norwalk, Ohio, plant of that company.

B. Olney Hough, for many years editor of the *American Exporter*, has relinquished that position to establish himself as export counsellor, consultant and adviser to banks, exporters, and manufacturers, with offices under the style of B. Olney Hough, Inc., 17 Battery Place, New York. He will continue to act as export and technical adviser and writer for the *American Exporter*, with the title of contributing editor. He enjoys the advantage of an experience fitting him to understand the problems of the exporter. He has been salesman, both domestic and foreign; he has been manager and buyer of manufacturing plants; he has operated as export merchant in this country and import merchant in foreign countries; and for 25 years he has traveled widely. He is the author of several books on exporting.

Alfred G. Way has been elected treasurer of the Fafnir Bearing Co., manufacturer of bearings and hangers, New Britain, Conn.

William D. Ferris, formerly manager Stanley Works, Great Barrington, Mass., has been made manager of the Shelby Steel Products Co., Shelby, Ohio.

Frederick L. Pierce, treasurer Cutler-Hammer Mfg. Co., Milwaukee, has been elected also first vice-president to succeed A. W. Berresford, who recently resigned. Frank R. Bacon was re-elected president. Beverly L. Worden was elected second vice-president, a new office.

Samuel M. Vauclain, president Baldwin Locomotive Works, has accepted an invitation from Dr. Thomas S. Baker, president of Carnegie Institute of Technology, to address the general assembly of students on March 14.

C. W. Pearson, who has been associated with the Buffalo Foundry & Machine Co. in various managerial positions for a number of years, and for the past year in charge of sales, has been elected vice-president and treasurer. In addition to the new duties he will continue as director of sales. P. J. Krentz, who for several years has been works manager, becomes vice-president and as in the past, he will continue actively in charge of manufacture and production. Both Mr. Pearson and Mr. Krentz have been with the company almost from its beginning.

J. Linde Hopkins, of the Hendee Mfg. Co., Springfield, Mass., has been elected to the directorate of the Wire Wheel Corporation of America to succeed Jacob Bretz, resigned.

Emmett B. Carter, an engineer of the Midvale-Cambria companies, has resigned to accept a position with the Barrett Co., 40 Rector Street, New York. He was chief engineer of the Midvale Steel Co. when it was bought by the Midvale Steel & Ordnance Co. and has continued with that organization. For the last two and one-half years he has been construction engineer at the Cambria plant at Johnstown, Pa.

E. J. McCarthy, for several years secretary to C. L. Miller, vice-president American Steel & Wire Co., Pittsburgh, has been assigned to the office of George W. Jewett, in charge of operations at the wire mills in the Pittsburgh district. Mills of the company in Braddock, Rankin, Donora, Farrell and Allentown, Pa., and Trenton, N. J., are grouped as Pittsburgh district mills.

C. V. Woodward has been appointed manager of the Baltimore office of the Westinghouse Electric & Mfg. Co., and F. C. Reed has been made manager of its Huntington, W. Va., office. R. J. Ross has been appointed assistant manager of the transportation division at the Philadelphia office, and W. F. James becomes manager of the industrial division, at the same office, succeeding R. F. Moon, who has resigned to accept the vice-presidency of the Atlantic Elevator Co., New York.

J. T. Trumble has been appointed experimental engineer of the Olds Motor Works, Lansing, Mich. He has been identified with the automobile industry for several years and was recently with the Samson tractor division of the General Motors Corporation.

Louis Obrecht, formerly chief engineer and general manager of the Superior Steel Spring Co., Mt. Clemens, Mich., has been appointed chief engineer and plant manager of the Saving Spring Co., Ashland, Mass.

The Michigan Wire Cloth Co., Detroit, has elected the following officers: Hugh O'Connor, president; Frank H. Croul, vice-president; C. E. Botsford, secretary. The board of directors consists of the officers and A. C. O'Connor and W. T. Barbour, all of Detroit.

The Union Steel Products Co., Albion, Mich., has elected the following officers: George E. Dean, president; Dr. E. L. Parmenter, vice-president; Brockway Dickie, secretary; E. D. Brown, treasurer. F. L. Sutherland of Detroit, and the officers of the company constitute the board of directors.

W. L. Brown, secretary Ettenger-Phillips Co., Philadelphia and New York, has sailed on the Southern Cross for an extended business trip to Brazil and Argentina.

Irving H. Jones, has resigned as sales engineer for Joseph T. Ryerson & Son, Chicago, to become director of railroad development for the Central Steel Co., Massillon, Ohio. He will maintain offices in the Peoples Gas Building, Chicago, at the Western headquarters of the Central Steel Co.

A. B. Cochrane, formerly district sales manager of the Steel & Tube Co. of America and the Mark Mfg. Co., and Robert Hofstetter, formerly engineer with the Illinois Tool Works, Chicago, and Nash Motors Co., Kenosha, Wis., have formed the American Tool & Mfg. Works, 652-54 West Lake Street, Chicago, and will manufacture special machinery, screw machine and punch press products.

James A. Campbell, president Youngstown Sheet & Tube Co., Youngstown, has gone to Boca Grande, Fla., for a few weeks' rest.

George S. Baton, Frank W. Byrne and R. H. Jamison were appointed receivers of the American Coke Corporation, Pittsburgh, in the United States District Court in Pittsburgh, March 6, on petition of the Union Explosive Co. on a claim of $4,600. The assets of the company are in excess of liabilities, but the petitioner claimed that some creditors threatened suits and the company's property was subject to judgment and executions.

The legislatures of Indiana and South Dakota in recent sessions adopted resolutions condemning the practice of using a Pittsburgh basing point in selling steel from Chicago district mills.

OBITUARY

COLUMBUS K. LASSITER, president Consolidated Machine Tool Corporation of America, 17 East Forty-second Street, New York, died suddenly on March 3, from heart failure. Mr. Lassiter was born at Roanoke, Va., 57 years ago. For the most part his business life was spent with the American Locomotive Co., in whose employ he entered in 1892 as a time keeper in the Richmond, Va., shops, becoming vice-president in charge of operations in 1912. Ten years later he resigned to become president of the Consolidated Machine Tool Corporation of America, of which he was one of the organizers. To Mr. Lassiter is attributed the development of the present type of stay-bolt machinery, both horizontal and vertical. He took out many patents for improvements in locomotive design and machinery for the manufacture of locomotives. He was a director of several industrial companies and at one time controlled the Baush Machine Tool Co., Springfield, Mass. He was a member of the Railroad Club and the Country Club of Virginia. Mr. Lassiter is survived by his wife, two daughters and a son, Robert B. Lassiter, secretary of the Consolidated corporation.

COLUMBUS K. LASSITER

JAMES PARIS WALKER, asistant secretary and manager of the order and shipping department of the Illinois Steel Co. at Chicago, died on Feb. 28, at his home in Evanston, Ill., following a brief illness. He was 56 years of age and was born in Hamilton, Ont. His first employer was Andrew Dallas, now of the Dallas Brass & Copper Co., Hamilton. He went to Chicago in 1887 and was employed by the Pullman Co. for a short period. His service with the Illinois Steel Co. extended over 33 years, during which time he served in various capacities, and at his death he was assistant secretary of the company, as well as head of the order and shipping department. Mr. Walker was a member of the American Iron and Steel Institute and had a wide acquaintance in the steel industry.

JAMES PARIS WALKER

HENRY E. GOODELL, founder of the Goodell-Pratt Co., Greenfield, Mass., and president of the Greenfield Machine Co. at its formation, died at his home in that city Feb. 23, in his 75th year. Mr. Goodell retired from active business in 1916.

JAMES ROMAN WARD, Jr., treasurer and manager Greenmount Iron & Mfg. Co., Baltimore, died on Feb. 20 after an illness of two months.

SHELDON NORTON, aged 76, died on Feb. 27 at the home of his daughter, Mrs. E. D. Yarrington, Carbondale, Pa. An attack of grippe, followed by pneumonia, was the cause of his death. For many years Mr. Norton was general manager for Witherbee, Sherman & Co. at Mineville, N. Y., and was well known in iron mine circles.

ALTON N. BATES, vice-president and general manager Erie Foundry Co., Erie, Pa., died on Feb. 17. He had been associated with the Erie Foundry Co. since 1904, prior to which time he had been identified with the Pennsylvania Boiler Works and before that, with the Anchor Line Steamship Co. He was born in 1873 at Spring Creek, Warren County, Pa.

FREDERICK W. LUDINGTON, formerly president of the Ludington Machine Co., Waterbury, Conn., died at his home in that city on Feb. 23, aged 64. Mr. Ludington retired from active service with the company in 1918, at which time he resigned as president. He was born in East Haven, Conn., in 1858.

JOHN M. KING, Pittsburgh district sales office of the Jones & Laughlin Steel Corporation, and son of Willis L. King, vice-president of that company, was seriously injured in a toboggan accident on Friday evening, Feb. 23, at the Pittsburgh Field Club, and on Feb. 28, died at the West Penn Hospital, Pittsburgh. He sustained a concussion of the brain and died without regaining consciousness. Mr. King was born in Pittsburgh 31 years ago, and attended Yale University. Except for the period of American participation in the World War, in which he served as a lieutenant of artillery, he had been identified with the Jones & Laughlin Steel Corporation in the Pittsburgh district sales office since 1915. His wife, a son, Willis L. King III, his parents and two brothers, Willis L. Jr. and Gordon King, survive.

JOHN M. KING

JOSEPH G. DEERICKS, general manager of sales of the Pittsburgh Steel Co., Pittsburgh, died at his home in that city March 6, following an illness of about a week's duration. He was born in Cleveland, Dec. 23, 1871, and was educated in the public schools of that city and the Christian Brothers College. He had been identified with the steel industry for more than 25 years. He was in the New York sales office of the American Steel Hoop Co., and continued with the Carnegie Steel Co. in Pittsburgh when the company took over the American Steel Hoop Co. Subsequently he became associated with the American Steel & Wire Co. in its New York office, having charge of sales of its wire products to manufacturers in the Eastern district. In April, 1917, he resigned that position to become assistant general manager of sales of the Pittsburgh Steel Co., and in November of the same year was promoted to general manager of sales, in succesion to Edmund Stetyler. He was a member of the American Iron and Steel Institute, the Engineers' Club of New York, the Ohio Society of New York, the Duquesne Club, the Oakmont Country Club, Pittsburgh Field Club and the Pittsburgh Athletic Club of Pitsburgh. Besides Mrs. Deericks, he is survived by two sons and a brother, Bernard G. Deericks of Cleveland.

IRA A. SHOFF, chief engineer West Penn Steel Co., Brackenridge, Pa., since its organization in 1908, died at his home in Tarentum, Pa., on Feb. 25. He was born in Osceola, Pa., in 1864 and became master mechanic of the Allegheny Steel Co. in 1900, leaving that company when the West Penn Steel Co. was formed. He had been in poor health during the past two years.

CHARLES A. HOW, general purchasing agent Missouri Pacific Railroad, died at his home in St. Louis on March 5. During the war, he was chairman of the Purchasing Committee, Southwestern Region, Railroad Administration. Mr. How was born in Brooklyn in 1866.

Machinery Markets and News of the Works

VOLUME IS INCREASING

Machine-Tool Business Shows Gradual Improvement

Ford Motor Co. Places Order for 75 Tools, Involving $150,000, with One Company

Although machine-tool business is still spotty and not wholly satisfactory in all branches, there is ample evidence of a gradually broadening demand. The total sales for February with most builders were encouraging, showing a gain over preceding months. Orders are coming from a wider variety of plants.

One of the noteworthy orders of the week was placed by the Ford Motor Co. with the Reed-Prentice Co., Worcester, Mass., involving 75 tools totaling $150,000 in value. This is the largest individual order received by a New England machine-tool builder in a long time.

Railroad business continues a prominent factor in current inquiry and sales. The St. Louis-San Francisco Railroad has begun purchasing against its recent list. The Union Pacific Railroad has issued a new list at Chicago calling for bids on about a dozen items. The Chesapeake & Ohio Railroad is expected to come into the market shortly for about $350,000 worth of shop equipment. The Union Switch & Signal Co., which has been a beneficiary of active buying of railroad equipment, is placing orders for tools and is said to contemplate a total expenditure of about $250,000. The Baldwin Locomotive Works continues to place orders against its recent large inquiry, which, as mentioned last week, will involve an outlay of $250,000 or more.

There has been a good demand for turret lathes. The National Cash Register Co., Dayton, Ohio, has bought seven; the Mead & Morrison Co., Boston, placed an order for five, and the Owens Bottle Co., Toledo, Ohio, is in the market for five.

Further price advances are reported. The Cincinnati Planer Co., Cincinnati, has advanced open-side planers 10 per cent; a manufacturer of riveting machines has put up prices about 15 per cent; a line of universal grinders has been advanced 10 per cent.

New York

NEW YORK, March 5.

VOLUME of inquiry for machine tools is increasing each week. Sales are also on the gradual upgrade. The past week was not marked by any conspicuously large sales, but orders are coming from more scattered sources. A large machine-tool company, which in the last four months of 1922 did two-thirds of its total business for the year, reports that its sales in January and February have been maintained at the rate established during the last quarter of 1922, with prospects that even larger totals will be reached within the next two or three months.

The crane market in this district is fairly active, particularly in electric overhead cranes. Besides the orders reported placed this week there are evidently a fair number pending for both electric overhead and locomotive cranes. The Bethlehem Steel Co., South Bethlehem, Pa., is reported on the point of closing for two small electric cranes, and there is an inquiry current from the General Electric Co., Schenectady, N. Y., for a 50-ton, 65-ft. span overhead traveling crane with 10-ton auxiliary and a 15-ton, 90-ft. span gantry crane with 25-ft. cantilever. The Metal & Thermit Corporation, 120 Broadway, New York, is said to be preparing an inquiry for four small overhead traveling cranes for a plant in California. While the purchase will be made in the New York territory, all bids will be submitted to Frank Ellis, consulting engineer, Pittsburgh. The Phoenix Utility Co., 61 Broadway, New York, will close this week for one 60-ton overhead traveling crane. This purchase will leave inquiries for two cranes for this company, a 60-ton overhead and a 65-ton gantry crane, still pending.

Among recent purchases are:

Eastern Steel Casting Co., Newark, N. J., formerly the Bayonne Steel Casting Co. of Bayonne, N. J., two 10-ton, 37-ft. 6-in. span electric traveling cranes from the Pawling & Harnischfeger Co.

Utah Copper Co., 25 Broad Street, New York, a 15-ton, 3-motor overhead traveling crane from the Whiting Corporation.

Millinocket Foundry & Machine Co., Millinocket, Me., a 5-ton, 30-ft. span, hand-power crane from the Whiting Corporation.

Stone & Webster, Boston, Mass., a 10-ton used Northwest crawl-tread locomotive crane from Hedge & Mattheis Co., Boston, Mass.

Anaconda Copper Mining Co., 25 Broadway, New York, a 25-ton, 65-ft. span electric traveling crane from the Pawling & Harnischfeger Co.

Pere Marquette Railway Co., Detroit, Mich., one 200-ton, four 15-ton and two 10-ton electric traveling cranes and one 15-ton hand-power crane from the Shaw Electric Crane Co.

Worthington Pump & Machinery Co., Cincinnati, two 3-motor, electric traveling cranes from Northern Engineering Works.

Olney J. Dean Co., Chicago, one 10-ton, 80-ft. span, 5-motor double trolley crane from Northern Engineering Works.

Celluloid Co., Newark, N. J., two 5-ton, 38-ft. span, 3-motor cranes from Northern Engineering Works.

The Superintendent of Lighthouses, Staten Island, N. Y., will receive bids until March 26 for an addition to the department machine shop, as detailed in proposal 14,286.

E. C. Sherwood, 50 Church Street, New York, railroad contractors' equipment, has been making inquiries for a 60-hp. electric hoist, with motor, to include triple tandem drums and swinging gear; also for a bronze bushed clamshell bucket, about 1 cu. yd. capacity.

Traveling cranes, elevators and other equipment, with power house, will be installed in the proposed railroad and steamship terminal to be constructed by George Backer, Inc., 285 Fifth Avenue, New York, on the block just purchased, bounded by Fifty-fourth and Fifty-fifth Streets, Eleventh and Twelfth Avenues. It will consist of a number of buildings, five-story and higher, estimated to cost $10,000,000.

The Chino Copper Co., 25 Broad Street, New York, contemplates new construction at its plant and the installation of labor-saving machinery for reduced production costs. The work is estimated to cost $150,000.

The Board of Water Supply, Municipal Building, New York, will take bids until March 20 for approximately 4650 tons of 42-in. flexible-jointed, cast-iron pipe for submarine service on Narrows Siphon No. 2, Catskill Aqueduct, with

bell-and-spigot cast-iron pipe connections. Benjamin F. Einbigler is secretary.

The New York Edison Co., 130 East Fifteenth Street, New York, has completed plans for a three-story power house at 127 East 120th Street, 25 x 92 ft., to cost $80,000.

The American Bridge Co., 71 Broadway, New York, is arranging to rebuild its template shop at Elmira Heights, N. Y., recently destroyed by fire with loss approximating $100,000.

Motors and other mechanical equipment will be installed in the new printing plant to be erected by the Fordham University, Fordham, N. Y., estimated to cost $300,000. Robert J. Reiley, 477 Fifth Avenue, is architect.

The Metropolitan Material Co., 1335 Flushing Avenue, Brooklyn, manufacturer of greenhouses, etc., is inquiring for a combination metal punch and cutting machine.

The New York Machinery Co., 200 Fifth Avenue, New York, is inquiring for a number of baling presses.

A manual training department will be installed in the new high and grade school to be erected at Seneca Falls, N. Y., estimated to cost $200,000. H. A. Carmer, Board of Education, is in charge.

The Seamless Rubber Co., Bloomingdale, N. J., organized to manufacture hard-rubber products, will install machinery in a local building for a new plant.

W. S. Barstow, head of W. S. Barstow & Co., 50 Pine Street, New York, operating the New Jersey Power & Light Co., Dover, N. J., and other electric properties, has organized the New Jersey Power Corporation, with headquarters at Phillipsburg, N. J., and capital of 25,000 shares of stock, no par value, to build an electric power plant for service in this section.

The Ulster Iron Works, Dover, N. J., manufacturer of bar iron, etc., has awarded contract to the Austin Co., Cleveland, for a one-story addition, 100 x 190 ft., with basement and mezzanine floor, for the production of drilled hollow staybolts and similar specialties. This line of manufacture heretofore has been conducted at Chicago, which works will be removed later to the new plant, which is estimated to cost $100,000, with equipment. The company contemplates the erection of two additional furnaces at the mills and will make other improvements.

The Board of Chosen Freeholders, Hackensack, N. J., will receive bids until March 14 for two 1000-gal. capacity tank trailers for transporting asphaltum, as per specifications on file. John A. Donaldson, chairman of the Road Committee, in charge.

A manual training department will be installed in the new three-story school to be erected on Main Street, Madison, N. J., estimated to cost $300,000, for which bids on a general contract will soon be called. Guilbert & Betelle, 546 Broad Street, Newark, are architects.

A one-story power house will be built by the Ingram-Richardson Mfg. Co., 227 Fulton Street, New York, manufacturer of enameled iron signs, at its new factory at Bayonne, N. J., for which contract recently was let.

A manual training department will be installed in the three-story high school, 105 x 230 ft., to be erected at West Orange, N. J., to cost more than $200,000, for which bids on a general contract will be received until March 26. Guilbert & Betelle, 546 Broad Street, Newark, are architects.

The Department of Public Affairs, City Hall, Newark, is planning for the installation of additional steam and electric power equipment at the power house at the Ivy Hill Alms House.

The Newark Metal Mfg. Co., 61 New Jersey Railroad Avenue, Newark, is in the market for steel tumbling barrels, plating equipment and a punch press.

Igoe Brothers, Avenue A and Poinier Street, Newark, manufacturers of nails, spikes, etc., have been making inquiries for a belt-driven air compressor, about 8 x 10 in.

Powell & Zuber, Inc., Newark, has leased a portion of the four-story factory at 65 Hoyt Street for the establishment of a new plant to manufacture toys and novelties. Equipment will be installed for the employment of about 150 operatives. Elmer F. Powell is president and C. Vail, secretary.

The Water Committee, South Orange, N. J., will receive bids until March 16 for a quantity of 6-in. cast-iron, bell-and-spigot, coated cast-iron pipe; valves and adjustable valve boxes. Lucius H. Bigelow, Jr., is chairman.

A manual training department will be installed in the new high school to be erected at Hightstown, N. J., estimated to cost $150,000, for which bids will soon be called on a general contract. Guilbert & Betelle, 546 Broad Street, Newark, are architects.

A. M. Harris, 28 West Kinney Street, Newark, is in the market for a Seymour & Whitlock foot-power mortising machine.

New England

BOSTON, March 5.

BUSINESS is less active in this territory, yet better distributed. Among local companies the general trend of demand is toward used tools. New England machine-tool builders are receiving additional business each week, and plants are operating at increased capacity. The Ford Motor Co. has placed approximately $150,000 worth of business with the Reed-Prentice Co., Worcester, involving 75 new machines, the largest individual order placed in this section for some time. The Norton Co., Worcester, recently took business from automobile manufacturers in the Middle West, while Connecticut tool makers gradually are increasing bookings. The inability of the trade to get railroads to set cars holds up deliveries of equipment purchased during February. Additional prospects have developed. The most important involves 15 lathes wanted by a maker of textile machinery. An excellent demand for low-priced drills is noted, individual prospects involving one or two machines, as a rule. In fact, much of the prospective machine-tool business suggests replacements rather than new enterprises.

Aside from an advance of 10 per cent in a line of universal grinders, no change in prices is reported.

The Palmer Steel Co., Palmer, Mass., has purchased a 10-ton Niles crane. No other crane sales were made the past week, but several are pending, ranging up to 60 tons. Sales of used tools include a 28 in. x 14 ft. lathe to a western New York company; a 30 in. x 30 ft. lathe to a Fall River textile concern; three smaller lathes, averaging 14 in., to Massachusetts users; a wet grinder to a New London, Conn., firm; a 2½-ft. Dreses radial drill to a Wakefield, Mass., foundry; a Kempsmith milling machine and a large disk grinder to a South Boston shop; a large flat turret lathe, Pratt & Whitney, turntable style, to a Boston firm, and a 62-in. milling machine and a large drill press to a Massachusetts corporation.

Small tools and machine-tool parts are in better demand. Hoists of all kinds sell well.

The Common Council, Chicopee, Mass., shortly will be in the market for 5,000,000-gal. capacity pump equipment.

The Crompton & Knowles Loom Works, Worcester, has completed plans for enlarging its forge shop and heat-treating department by an addition, 80 x 100 ft., of brick and steel, one story, with monitor roof. The present forge shop has been outgrown, and increased equipment and general facilities are required.

The Weir Stove Co., Taunton, Mass., manufacturer of Glenwood ranges, has let contract to the M. Witherell Sons Co., Taunton, for a four-story, 77 x 114-ft. brick, steel and wood addition.

Tentative plans are in progress for the erection of a 3000 to 3500-ton capacity coal-handling plant on property close to the Westinghouse Electric & Mfg. Co., East Springfield, Mass. Unloading apparatus will be required. A company will shortly be organized under Massachusetts laws.

Wilbur C. Walker, president Westfield Mfg. Co., Westfield, Mass., and others, have tentative plans for the reorganization of the former Pope Mfg. Co., which some years ago was consolidated with the Westfield concern. If present plans carry the Pope Mfg. Co. will locate in Hartford, Conn., and engage in the manufacture of children's vehicles.

The installation of an additional turbo-generator, 12,500-kw. capacity, and other improvements, are contemplated by the Worcester Electric Light Co., Worcester, Mass.

The plant of the Cambridge Machine & Tool Co., 234 Washington Street, Somerville, Mass., was destroyed by fire last week.

Plans have been completed for a one-story, 50 x 50-ft. power plant to be erected by the Uxbridge Worsted Co., Uxbridge, Mass.

Bids are in on a three-story plant, 64 x 200 ft., to be erected by the Gilman Paper Co., Gilman, Vt.

The Waterbury Watch Co., Waterbury, Conn., is moving equipment from its Trenton, N. J., plant to the Waterbury plant, formerly occupied by the New England Watch Co. It is not purposed to close the Trenton plant, but to greatly reduce operations there.

The Moore Drop Forge Co., Springfield, Mass., has awarded contract to Adams & Ruxton, 387 Main Street, for

a one-story building, 76 x 103 ft., at its Chicopee, Mass., works, to be used as a heat treating department. It will cost $75,000, with equipment.

The Agricultural Committee of the State Legislature, Hartford, Conn., is planning the erection of a mechanical and machine repair building at the Connecticut Agricultural College, Storrs, Conn., to cost $25,000. The work will be carried out in conjunction with other structures to cost $450,000.

The Edison Electric Illuminating Co., 70 State Street, Boston, will commence the erection of a new electric generating plant at 776 Summer Street to cost $200,000. A new power house will also be built at Warrenton and Carver Streets, for which plans are being drawn by Stone & Webster, Inc., 147 Milk Street, architects and engineers.

A power house, cold-storage plant, traveling ovens and other machinery will be installed in the four-story plant to be erected at Fair Haven, Conn., 222 x 326 ft., by the Ward Baking Co., Southern Boulevard and St. Marys Street, New York, to cost approximately $400,000. Bids will be received on a general contract until March 20. C. B. Comstock, 110 West Fortieth Street, New York, is architect and engineer.

The Walworth Mfg. Co., 798 First Street, South Boston., has awarded contract to the Aberthaw Construction Co., 27 School Street, for a one-story addition to its wrench and tool manufacturing plant to cost $25,000.

A manual training department will be installed in the new high school to be erected at Orange, Mass., estimated to cost $130,000. The Board of Education is in charge.

The Acme Machinery & Equipment Co., Newington, Conn., is arranging for the erection of a new one-story plant, 100 x 225 ft., to cost $85,000.

Fire, Feb. 26, destroyed the engine house and repair shop of the Boston & Maine Railroad, at Reading, Mass., with loss reported in excess of $90,000, including machinery. It is planned to rebuild.

The Elliott Addressing Machine Co., Albany Street, Cambridge, Mass., has awarded contract to the S. C. Sperry Co., Inc., 299 Main Street, for a four-story and basement addition, 45 x 75 ft., to cost $50,000.

The Connecticut Power Co., New Haven, Conn., will build a new power house on Water Street, Middletown, Conn. Improvements will also be made in the Cromwell power house in this district.

A manual training department will be installed in the new central high school to be erected at Watertown, Mass., to cost approximately $200,000. McLaughlin & Burr, 88 Tremont Street, Boston, are architects.

The Boston Elevated Railway Co., 108 Massachusetts Avenue, Boston, will commence foundations for its new car repair shops at Everett, Mass., to consist of two one-story buildings, 160 x 300 ft.; two buildings, 53 x 55 ft.; transferway, 80 x 725 ft., and underground yard work. The plant will cost about $3,000,000 with machinery. Dwight P. Robinson & Co., 61 Broadway, New York, are engineers,

The Gillette Safety Razor Co., 41 West First Street, South Boston, has approved plans for an eight-story and basement addition, 75 x 100 ft. It will cost about $200,000. Charles T. Main, 49 Federal Street, is architect and engineer.

A manual training department will be installed in the high school to be erected at Franklin, Mass., estimated to cost $200,000. The Board of Education is in charge.

Beaudry & Co., Inc., 45 Bromfield Street, Boston, manufacturer of power hammers, etc., is planning for the installation of a 10-ton traveling crane, 28 ft. span, in connection with an addition.

The Central Vermont Railway Co., St. Albans, Vt., wants to buy 525 gross tons of No. 1 80-lb. relay rails with fastenings. ASCE open hearth is preferred. Address H. M. Dewart, is purchasing agent.

Philadelphia

PHILADELPHIA, March 5.

A MACHINE SHOP and parts department will be installed in the new one story service works, 65 x 215 ft., to be established by the Auto Car Co., Ardmore, Pa., manufacturer of motor trucks, in a building being erected on Whalley Avenue, New Haven, Conn., estimated to cost $50,000. Horace W. Castor, St. Girard Building, Philadelphia, is architect.

The Brown Instrument Co., Wayne Avenue and Roberts Street, Philadelphia, manufacturer of pyrometers, etc., has awarded a contract to R. C. Ballinger, 925 Walnut Street, for a one-story addition.

J. C. Harry Kunz, 3037 West Girard Street, Philadelphia, operating a mechanical experimental works, is inquiring for a drill press and lathe.

The Pennsylvania Equipment Co., Norwood Station, Pa., has been inquiring for a 350 to 500-hp. motor, 60 cycle, 2300 volts.

The Foreign Trade Bureau, Philadelphia Commercial Museum, Thirty-fourth Street, has received an inquiry from a company at Tokyo, Japan, for forging machinery and tools; from a company at Manila, P. I., for American machinery for bolt and nut manufacture also for can manufacture, and from a company at Havre, France, for labor-saving and engineering machinery.

The Philadelphia Electric Co., Tenth and Chestnut Streets, Philadelphia, has purchased property adjoining its Sansom Street power plant, 100 x 100 ft., for an addition.

Bayuk Brothers, 1106 Montgomery Avenue, Philadelphia, have inquiries out for a 15-hp. motor, mechanical blower and mechanical air-washing machine for installation in their tobacco factory.

The New Jersey Twin Hoist Co., 201 Calhoun Street, Trenton, N. J., recently organized with a capital of $200,000 to manufacture mechanical hoists and parts, has awarded contract to William R. Throop & Sons, East State Street, for its new plant on North Cook Avenue, one-story, 60 x 100 ft., estimated to cost $85,000 with machinery. Joseph W. Throop and James W. West, 216 Wood St., head the company.

George L. Atkins, Langhorne, Pa., has acquired the plant of the Reeves Foundry Co., Ward Avenue, Trenton, N. J., at a sheriff's sale, for $77,000. The new owner is said to be planning the organization of a company to re-establish and operate the works.

The Trenton Potteries Co., Clinton and Ott Streets, Trenton, N. J., manufacturer of sanitary ware, has awarded contract to S. W. Mather & Sons, Greenwood Avenue, for two additions to its Equitable pottery, Lalor and Hancock Streets, four stories and one story, respectively, to cost $80,000.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until March 20 for 5000 ft. of electric wire for the Philadelphia Navy Yard, schedule 584; and until March 13 for a quantity of steel tubing, schedule 548.

The Penn Metal Co., Twenty-fifth and Wharton Streets, Philadelphia, has acquired the steel rod and bar business of the Midvale-Cambria Co., Widener Building, covering the New England plant and business, Boston, with machinery and tools. The new owner will continue the operation of the Midvale works in conjunction with its present factory at North Cambridge, Mass. A new rod and bar plant is now in course of erection at the Penn Metal works, and when completed the equipment from the Midvale plant will be removed to this location.

P. F. & M. T. Howley, Wyoming Avenue, Scranton, Pa., are contemplating the erection of a new one-story plant for the manufacture of sheet metal products, estimated to cost $37,000 with machinery.

The Wilkes-Barre Iron & Wire Works, Inc., Wilkes-Barre, Pa., is perfecting plans to double the present capacity. A new building is now in course of erection and a list of equipment will soon be arranged.

The O. C. Antes Coal Co., High Street, Williamsport, Pa., is planning the installation of conveying and other coal-handling equipment.

The International Radiator Co., Commonwealth Building, Allentown, Pa., has plans for additions for a daily capacity of 600 radiators. The floor space will be increased from 10,000 to 40,000 sq. ft. The company is headed by Arthur E. Nicholas and George H. Ormrod.

The South Lebanon Township School Board, Lebanon, Pa., is selecting a site for a new vocational school and will have plans prepared at an early date. It is estimated to cost $90,000.

The power house and plant of the Montgomery Ice & Coal Co., Norristown, Pa., were partially destroyed by fire Feb. 21 with loss of $55,000. It is planned to rebuild.

The Milford Township Power Co., Philadelphia, has been chartered under State laws to install and operate a plant and system in Milford Township. R. Van Horn, 4929 Catherine Street, is treasurer.

The Department of Public Health, Room 584, City Hall, Philadelphia, is planning to purchase a combination bench saw and jointer.

The Harbison-Walker Refractories Co., Farmers' Bank Building, Pittsburgh, is said to be planning the erection of a new plant at Lock Haven, Pa.

The Pennsylvania Water & Power Co., Holtwood, Pa., is planning for enlargements in its hydroelectric generating plant on the Susquehanna River. The installation will in-

clude two new 19,000-hp. generating units, with auxiliary machinery, and is estimated to cost $450,000.

The Aluminum Pigment and Products Co., Lehighton, Pa., recently organized, has awarded contract to Charles Fenstermacher, Lehighton, for the erection of a new plant near Bowmanstown, Pa. A portion of the machinery installation will be furnished by the Fuller-Lehigh Co., Fullerton, Pa., and orders for other equipment will soon be placed. The plant will cost about $30,000.

The East Penn Electric Co. Pottsville, Pa., will proceed with the erection of its new electric power plant, on which work has been started, and is securing an appropriation of $2,500,000 for the completion of the project and purchase of machinery. It will have a capacity of 33,000 hp. J. H. Pardee is president.

The Pittsburgh Construction Co., Diamond Bank Building, Pittsburgh, is in the market for a locomotive, 10 x 16-in. cylinders, 36-in. gage, saddle tank, A. S. M. E. boiler, weight 18 tons or more.

Baltimore

BALTIMORE, March 5.

THE Consolidated Gas, Electric Light & Power Co., Baltimore, plans to erect a meter shop, laboratory and fitting department at 1092 North Front Street on the site now occupied by one of the company's buildings. The new structure will be four stories.

The Harvey Co., 113 South Street, Baltimore, contractors' equipment, has inquiries out for an 8-wheel crane, 50 ft. boom, 20 tons capacity.

The American Can Co., Maryland Trust Building, Baltimore, has awarded contract to the Ferro Concrete Construction Co., Cincinnati, for a four-story plant, 88 x 198 ft., at Boston and Hudson Streets, estimated to cost $160,000. Headquarters are at 120 Broadway, New York.

The General Purchasing Officer, Panama Canal, Washington, will take bids until March 14 for machine bolts, four brass melting crucibles, 200 foundry brushes, sheet copper, bronze, and other mechanical equipment as set forth in circular 2314.

The Chattahoochee Brick Co., 701 Fourth National Bank Building, Atlanta, Ga., is in the market for a steam shovel, ½-yard capacity. H. L. English is head.

A manual training department will be installed in the three-story senior high school, 160 x 204 ft., to be erected at Roanoke, Va., estimated to cost $600,000, for which bids will be received on a general contract until March 15. H. Courcy Richards, 608 Chestnut Street, Philadelphia, is architect.

The Southern Ice Machine Co., Charlotte, N. C., is arranging for a lease of local property for the establishment of a new plant to manufacture ice and refrigerating machinery. Later, a new plant will be built. F. A. Owens is president.

A manual training department will be installed in the new high school, 225 x 260 ft., to be erected at Cumberland, Md., for which a site is now being secured. It is estimated to cost $500,000.

Charles L. Rhode & Sons, Inc., foot of Third Street, Baltimore, operating a shipbuilding and repair plant, is said to be arranging a list of machine tools and other equipment to be installed at its new works, to replace the section recently destroyed by fire.

J. L. Townsend, Manquin, Va., is inquiring for a quantity of wood-working machinery.

The Baltimore Ice Mfg. Co., 651 West Baltimore Street, Baltimore, has purchased a site at 309-11 North Exeter Street, 60 x 164 ft., for a new plant. It will have a daily capacity of 125 tons and is estimated to cost $150,000 with machinery.

A manual training department will be installed in the new high school to be erected at Cheraw, S. C., estimated to cost $90,000 for which bids are being taken on a general contract. W. J. Wilkins & Co., Florence, S. C., are architects.

The Guilford Lumber Co., Greensboro, N. C., has preliminary plans for the rebuilding of the portion of its plant on Ashe Street, recently destroyed by fire with loss in excess of $150,000, including machinery.

A manual training department will be installed in the new high school to be erected at Hendersonville, N. C., estimated to cost $300,000. The Board of Education is in charge.

The Moore & Rachels Co., Culverton, Ga., is in the market for mechanical belting.

The Athens Ice & Coal Co., Athens, Ga., has inquiries out for an electric generator, 5 to 7½ kw.

Carter's Production Works, Inc., 210 South Front Street, Wilmington, N. C., is inquiring for a 15-ton locomotive, 36-in. gage; also for 36-in. gage log cars.

The North Carolina Granite Corporation, Mt. Airy, N. C., is in the market for a two-cylinder, steam-operated drag engine, with drum to accommodate from 1500 to 2000 ft. of steel cable.

Fred L. White, Buckhead, Ga., is in the market for power house equipment, including boiler and engine, about 20 hp.

Motors, ovens and other equipment will be installed in the three-story plant, 100 x 125 ft., to be erected by the Pender Grocery Co., Norfolk, Va., estimated to cost $125,000 with machinery.

The Continental Brick & Tile Co., Chapel Hill, N. C., recently organized, will commence the erection of a new plant at Belmont, N. C., with initial output of 35,000 brick per day. A power house and machine shop will be built. J. C. Gullick is president.

The Holland Mfg. Co., Central Avenue and Bank Street, Baltimore, manufacturer of tacks, nails, spikes, etc., will take bids at once on a general contract for a four-story L-shaped addition, to cost approximately $35,000.

D. C. Elphinstone, 408 Continental Building, Baltimore, machinery dealer, is inquiring for a steam shovel, caterpillar tread, Erie type B, preferred; also for two 10-ton tractors.

John C. Henry, Greenville, S. C., will soon open negotiations with manufacturers for the production of a patented wrench, formed of one piece, solid steel. It is purposed to contract for manufacture in quantity.

Fire, Feb. 21, destroyed a portion of the veneer mill of the Wagoner Lumber Co., Pamplico, S. C., with loss approximating $55,000 with equipment. It is planned to rebuild.

The Kelly-Springfield Tire Co., Cumberland, Md., will make extensions in its local plant to cost approximately $300,000, including the installation of additional machinery.

A manual training department will be installed in the proposed high school to be erected at Del Ray, Fort Myers Heights, Va., estimated to cost $90,000. The Jefferson School district, Fletcher Kemp, superintendent, is in charge. An architect will soon be selected.

The Wilson-Hock Co., City Point, Va., machinery dealer, is in the market for a 50 to 75-kw. generator, belted type, 2300 volts; also, for a water wheel, size suitable to drive 80-hp. equipment, and for transformers, steel stack, 20,000 to 30,000-gal. steel tank on 50 ft. steel tower; 3, 5, 10 and 75-hp. motors, and motor-driven exhaust fan.

The McNair-Young Oil Co., Wrens, Ga., has tentative plans for rebuilding the portion of its works destroyed by fire Feb. 23, with loss estimated at $50,000 including equipment.

The American Marble & Tile Co., 28 Confederate Avenue, Atlanta, Ga., will install gang saws and kindred equipment at its plant. G. B. Thompson is vice-president and general manager.

A power house will be built by the Pacific Mills, 101 Milk Street, Boston, at its new 30,000-spindle cotton mill, on site recently acquired at Spartanburg, S. C.

Pittsburgh

PITTSBURGH, March 5.

FEBRUARY fulfilled the January expectations of machine-tool business. Possibly sales the past month were no more numerous than those of the previous month, but the volume and money value were greater. The opinion of the trade now is that if the rest of the year continues as good as the first two months there will be no cause for complaint. The Union Switch & Signal Co. is closing steadily against a list said to contemplate the expenditure of approximately $250,000. This company recently closed for two board drop hammers and two steam drop hammers. Several hammers for the new Gary tube works of the National Tube Co. are expected to be placed in the near future.

Price tendencies still are toward higher levels, though no specific advances lately have been announced.

The market for heavy equipment is quiet as far as actual business is concerned, but very active in prospective requirements, particularly steel mill. Few of the Steel Corporation units have failed to draw plans for new equipment installa-

tions, the question now is whether the appropriations will be granted. The Mackintosh-Hemphill Co. has taken an order for another manipulator, this one for the 40-in. blooming mill at the Duquesne works, Carnegie Steel Co. The National Metal Moulding Co., Economy, Pa., has placed an order for two 10-ton and one 5-ton crane, and Spang, Chalfant & Co. have ordered two 5-ton and one 10-ton crane. The Metal & Thermit Corporation, which is building a new sheet plant on the Pacific Coast, is expected to send out through Frank I. Ellis, Farmers Bank Building, Pittsburgh, the formal inquiries for six sheet mills and all other equipment this week. The Reliance Coke & Furnace Co. has closed for a 10-ton crane, bridge and trolley hand-operated, with an electric hoist.

Higher prices are being talked about for electrical equipment, makers of which have had an exceptionally heavy business in the past two months and now are so heavily committed as to be unable to assure deliveries, except in a few cases, short of 12 to 14 weeks. A maker of wrought iron pipe recently closed for a 1500-kw. alternator unit and rotary converter, and a Buffalo steel maker has bought the motor for the drive for a 40-in. blooming mill.

The Philadelphia Co., 435 Sixth Street, Pittsburgh, operating public utility properties, is arranging for extensions and improvements in a number of plants, including the erection of an addition to its steam generating plant on Duquesne Way, where adjoining property has been purchased, totaling 5500 hp.; the boilers will be provided with self-feeding stokers. A new coal terminal, with hoisting and conveying machinery, will be built on the Allegheny River to handle a portion of the output from its mines. A new gas plant will be built at El Ramo. To provide for expansion, the company is disposing of a bond issue of $10,000,000.

The Corry-Jamestown Corporation, Corry, Pa., manufacturer of metal furniture, has acquired adjoining property and plans an addition to double approximately the present capacity.

A machine shop and parts department will be installed in the new four-story and basement service building, 87 x 120 ft., to be erected on the Baum Boulevard, Pittsburgh, by the National Pittsburgh Automobile Co., 5245 Baum Boulevard, estimated to cost $100,000. Karl G. Snyder is president.

The Equitable Meter Co., 424 First Avenue, Pittsburgh, has leased a nine-story building at 429 First Avenue, totaling 24,000 sq. ft. of space, and will remodel the structure for an addition.

The New Castle Metal Products Co., 716 West Brant Street, New Castle, Pa., Jonas Kaufman, head, is contemplating the erection of a new one-story plant, 40 x 185 ft.

The Sharon Brick & Clay Co., Sharon, Pa., recently organized, has acquired the plant of the Sharon Clay Products Co. for $100,000. Extensions and improvements will be made and the capacity developed to an output of 1,000,000 brick per month. H. D. Beegle, New Galilee, Pa., heads the organization.

The Vulcan Mold & Iron Co., Latrobe, Pa., is arranging for the establishment of a local plant to manufacture split and solid ingot molds, merchant castings, etc. The equipment installation will include a 15-ton traveling crane.

A manual training department will be installed in the two-story high school to be erected at Broomall, Pa., estimated to cost $150,000, for which bids have been asked on a general contract. Henry L. Reinhold, Jr., 1513 Walnut Street, Philadelphia, is architect.

A machine shop and parts department will be installed in the six-story service building, 90 x 100 ft., to be erected at Huntington, W. Va., by the Motor Sales Co., 1611 Sixth Avenue, estimated to cost $200,000. Meanor & Handloser, Robson-Prichard Building, are architects.

George S. Fuller, Paw Paw, W. Va., is planning for the installation of an electric light and power plant. Inquiries are being made for equipment.

A manual training department will be installed in the two-story and basement high school, 96 x 100 ft., to be erected at Parnassus, Pa., estimated to cost $150,000. Paul Irwin, Renshaw Building, Pittsburgh, is architect.

The Lewis County Cut Glass Co., Weston, W. Va., is planning the erection of a new factory to cost in excess of $60,000.

C. H. Dowler, city manager, Wheeling, W. Va., is taking bids until March 28 for a 20,000,000-gal. electrically operated pumping plant, in connection with a new filtration works, estimated to cost $500,000 with machinery. The J. N. Chester Engineers, Union Building, Pittsburgh, have plans.

Motors, conveying and other equipment will be installed in the printing plant to be erected by the Press Publishing Co., 228 Oliver Avenue, Pittsburgh, estimated to cost $800,000.

Buffalo

BUFFALO, March 5.

THE Federal Concrete Co., Inc., Buffalo, has plans for new works to manufacture cement and concrete products to consist of a main factory, one and two stories, 80 x 110 ft., with three one-story structures adjoining. Walter E. Jones is president.

The Rome Wire Co., Railroad Street, Rome, N. Y., manufacturer of electrical wires and cables, has awarded contract to the J. W. Cowper Co., Fidelity Building, Buffalo, for a one-story addition to its Buffalo branch plant, 33 x 300 ft., estimated to cost $40,000.

The Penn Yan Board & Paper Co., Inc., Penn Yan, N. Y., recently organized, will take over the plants of the Niagara Wall Board Co., Inc., and the Niagara Fibre Co., Inc., for the manufacture of paper and fibre board products. The works will be extended to develop maximum capacity, and a fund of $100,000 will be provided by a preferred stock issue. John B. O'Brien is president.

The Standard Foundry Co., 743 Hertel Avenue, Buffalo, manufacturer of grey iron castings, is planning for the installation of two electric traveling cranes, about 3 and 5-tons capacity, respectively.

The Binghamton Light, Heat & Power Co., Binghamton, N. Y., will install a 10,000-kw. turbo-generator and auxiliary machinery at its power plant.

The Lamson Co., Eastwood, N. Y., manufacturer of conveyor systems, etc., is inquiring for a double-acting punch press, about 3 in. stroke.

The Co-Operative Foundry Co., Lincoln and West Streets, Rochester, N. Y., is said to be planning for the installation of additional equipment.

The Town Board, Tonawanda, N. Y., will receive bids until March 21 for an electrically-operated pumping plant, in conjunction with a new sewerage disposal plant and system. Elmer W. Johnson is town clerk. George C. Diehl, 575 Ellicott Square, Buffalo, is engineer.

The Cleveland & Buffalo Coal Co., Prudential Building, Buffalo, will install an electrically-operated portable conveyor for coal loading and unloading, and other mechanical equipment, at its new yard at 60 Marion Street, Black Rock, N. Y. M. G. Siener is president.

The New York Telephone Co., Telephone Building, Buffalo, has awarded contract to the John W. Cowper Co., Fidelity Building for a three-story building, 150 x 200 ft., on East Delavan Avenue. The first floor will be equipped as a service and machine works for company motor trucks and cars; the second floor will be used in part for mechanical and machine shops, and the remainder, for the present, for storage. It will cost about $250,000, with machinery.

The Porter-Cable Machine Co., 501 East Water Street, Syracuse, has acquired the plant and business of the Syracuse Sander Mfg. Co., and will manufacture this line of equipment in the future.

The St. Lawrence Motor Sales Co., Potsdam, N. Y., will install an oxy-acetylene welding plant, drills and other equipment at its repair works.

A manual training department will be installed in the proposed high school to be erected at Akron, N. Y., estimated to cost $275,000.

Brandon & Brandon, 341 State Street, Watertown, N. Y., operating an electrical repair works, are planning for the installation of a lathe, hand tools and other equipment.

The City Council, Watertown, N. Y., has plans under consideration for the construction of a municipal water power electric plant at Delano Island. Bonds for $415,000 have been voted. P. B. Sutton is city engineer.

The sum of $82,500, half of what was asked for, has been appropriated by the city for equipping the Buffalo Orphan Asylum for use as a vocational school. Twenty-six shops were originally planned but only about half this number will be equipped this year. Requirements called for in the original plans included eight quick-change engine lathes; one vertical Cincinnati milling machine with constant speed drive, motor included; two heavy universal milling machines, motors included; one high duty shaper; one grinding machine; one tool grinder; two 15 hp. motors.

The capital stock of the Oldman-Magee Boiler Works, Buffalo, has been increased from $5,000 to $300,000. The original incorporation was made about 19 years ago. Plans will be made soon, according to Edward Oldman, for increased manufacturing facilities.

New ashpits and ash handling machinery will be installed by the Buffalo, Rochester & Pittsburgh Railway Co. at Salamanca and other points at an expenditure of about $200,000.

Five macaroni manufacturing companies of Buffalo have

merged into a new corporation known as the People's Macaroni Co., Inc., with a capital stock of $500,000. Machinery and equipment of the different companies will be consolidated at the plants of the Central Macaroni Co., 34 Mechanic Street, and the Liberty Macaroni Mfg. Co., 119 Wilkinson Street. Some new equipment will be needed.

The Eastman Kodak Co., Rochester, N. Y., has awarded contract to the Ridge Construction Co. for a new power house, 80 x 110 ft., to be erected in Kodak Park at an estimated cost of $84,000.

The Rochester Gas & Electric Co. has purchased about three acres in Lincoln Park, opposite the General Railway Signal Co.'s plant, and will erect a new substation during the summer. Work will be started in about a month on a new substation in Swan Street.

Cleveland

CLEVELAND, March 5.

THE machinery market is becoming more active. Local tool manufacturers received some good orders the last few days of February which swelled their month's total to well above that of January, and prospective business indicates that March will show a good gain over February. The National Cash Register Co., Dayton, Ohio, during the week purchased seven turret lathes and the Mead & Morrison Co., Boston, five large turret lathes, both orders going to a Cleveland manufacturer. The Owen Bottle Co., Toledo, Ohio, has an inquiry out for five geared head turret lathes.

The demand from the automobile industry continues active. The Ford Motor Co. is still buying equipment in small lots and the Cadillac Motor Car Co., during the week purchased six turret lathes and Dodge Brothers a few machines. The Chevrolet and the Oakland companies, both divisions of the General Motors Corporation, are understood to be working on large lists of requirements. The General Motors Corporation a year ago had machinery stored in its Detroit surplus machinery warehouse having an estimated value of $2,000,000, much of it in good condition, but a great deal of this equipment has been sent out to various plant units. The Galion Iron Works Mfg. Co., Galion, Ohio, is still buying machinery and during the week purchased three planers. The demand for automatic machinery in small lots or single machines has also become active. Local dealers report a good volume of business, mostly in single tools, and a number of inquiries are pending for large machines.

With improved business, local machine tool manufacturers are increasing their plant operations, but are finding both common and skilled labor scarce. Common labor has been diverted to the building trades where higher wages are being paid than in the shops, and some local skilled labor has been diverted to Detroit automobile plants.

The Bingham Stamping & Tool Co., Toledo, Ohio, has purchased the plant of the Watson Mfg. Co. at Post and Albion Streets, its present plant on Dorr Street having been sold. The company will install additional equipment in the Watson plant and double its capacity.

The Oberlin Machinery Co., Oberlin, Ohio, has been organized to take over the plant of the Ohio Road Machinery Co. of that city, which has been in the hands of a receiver. H. W. Ingersoll is president of the new company.

The Homer Engineering Co., Canton, Ohio, will add to its motor and general machine shop an engineering department which will have charge of the designing and manufacture of labor-saving machinery. It will be under the management of F. A. Carlisle, formerly president Western Efficiency Society, Chicago, who has become affiliated with the Homer company and is secretary and treasurer.

The New Haven Sherardizing Co., Akron, Ohio, is placing its plant in operation at 1917 Sweitzer Avenue. Edwin Y. Judd is president and August F. Schoen is vice-president and general manager.

The Gilliam Mfg. Co., Canton, Ohio, has placed contract for a heat treating department, 72 x 100 ft., and has just completed a two-story roller bearing plant and is preparing plans for a third factory.

The Louisville Machine Mfg. Co., Louisville, Ohio, is considering some extensions to its plant.

The Citizen's Ice & Supply Co., Bellefontaine, Ohio, will build a new ice-manufacturing plant to cost approximately $70,000.

The Ohio Cutlery Mfg. Co., Massillon, Ohio, has been incorporated with a capital stock of $50,000 to take over the present plant of the Ohio Cutlery Co.

The plant of Simpson Brothers, 2204 Gallia Street, Portsmouth, Ohio, was damaged by fire on Feb. 21. The machine shop was destroyed but the foundry, pattern storage building and office suffered no damage. The company will build a new shop and is in the market for equipment.

The Shartle Brothers Machine Co., Middletown, Ohio, is asking for bids on a 10-ton crane and a one-story steel shop building about 40 x 480 ft.

Chicago

CHICAGO, March 5.

BUSINESS continues to show a steady increase in volume, although consisting largely of orders for single machines. February sales totals were encouraging; in fact, two important dealers report the largest month's bookings since 1920. It is particularly noteworthy that little of this buying was by the railroads or the automotive industry, which have accounted for the bulk of local business for many months. Orders are coming from a wide variety of shops, and, while it cannot yet be said that a heavy buying movement is under way, the market is gradually, but steadily, gathering momentum. The Union Pacific has issued a list of a dozen items, and word comes from St. Louis that the St. Louis-San Francisco is about to close against its extensive inquiry. The Chicago, Indianapolis & Louisville is in the market for a swinging cut-off saw, to cut timber up to 6 x 15 in., and pieces up to 8 in. sq. The Simmons Co., Kenosha, Wis., which has recently gone into the manufacture of metal household furniture in addition to bedsteads, is buying a few machines from time to time.

Prices are unchanged, except for an advance in riveting machines of about 15 per cent.

The Union Pacific List

One 72-in. bending roll.
One 48-in. carwheel boring machine.
One 6-spindle nut tapper.
One 3-in. pipe machine.
One 24-in. motor-driven grinding machine.
One 2½-in. bolter header.
One 48-in. throat double punch and shear.
One plain grinding machine with 10 x 36-in. wheel.
Two 4½-in. and one 6-in. special locomotive cylinder boring bar.
One 5000-lb. single frame steam hammer.
One 15-ton electric traveling crane.

The Shaw Crane Co. has been awarded one 200-ton, five 15-ton, and two 10-ton electric traveling cranes for the new Pere Marquette shops at Grand Rapids, Mich. The Goodman Mfg. Co., Chicago, has awarded to the Pawling & Harnischfeger Co. three 25-ton, three 20-ton, two 15-ton, and two 10-ton electric traveling cranes.

The Harrington & King Perforating Co., manufacturer of mining screens, 614 North Union Avenue, Chicago, has had plans prepared for a one-story factory, with 60,000 sq. ft. of floor space, on the southwest corner of Kilbourn and Waller Streets, to cost $275,000

H. H. Hoffman & Co., printers of bank stationery, 712 Federal Street, Chicago, have commenced the construction of a one-story plant, with 4000 sq. ft. of floor space, at Lincoln and Walnut Streets, to cost $40,000.

The Justrite Mfg. Co., manufacturer of cans, fire extinguishers, lamps, etc., 2061 Southport Avenue, Chicago, has let contract for a four-story factory, 86 x 101 ft., at 2071-81 Southport Avenue, to cost $100,000.

The American Electric Co., 2620 Diversy Avenue, Chicago, has let contract for a one-story factory, 80 x 130 ft., at 2606-16 Diversy Avenue, to cost $25,000.

The Anaconda Products Co., East Chicago, Ind., has started the construction of a second unit of its zinc oxide plant, the first department of which was placed in operation Jan. 1. The building will cost $250,000. The company is a subsidiary of the Anaconda Lead Co., which also controls the International Lead Refining Co., a plant of which is likewise located at East Chicago.

The National Plate Glass Co. contemplates the erection of a large plant at Ottawa, Ill.

Fire recently damaged the plant of the Marcus Iron Works, Peoria, Ill., the loss being estimated at $35,000.

F. P. Parish, Chicago, has purchased the foundry owned by the Holland Engine Co., Holland, Mich., and will move to that city. The foundry was erected about four years ago, but has been idle for the past three years, largely because of a change in the type of engines manufactured by the Holland Engine Co. The building, which is 60 x 85 ft., will be enlarged by the new owner.

The Keith Furnace Co., Des Moines, Iowa, has completed a new plant at Twenty-sixth and Dean Streets, at a cost of $150,000. Space has been provided for a foundry, a register shop and a warehouse.

The Marquette Cement Mfg. Co., 140 South Dearborn Street, Chicago, has preliminary plans for a new plant at Davenport, Iowa, to cost $160,000. The company will also build a one-story works, 175 x 500 ft., on Elston Avenue, Chicago, to cost approximately $250,000 with equipment. L. E. Ritter, company address, is engineer.

The Belle Marie Mining & Milling Co., Ashcroft, Colo., has plans for a new power house and mechanical shop. A new milling plant will also be built. The work is estimated to cost $500,000, including machinery. A. J. Petelinz, 428 Grand Avenue, Milwaukee, is engineer.

A machine shop and parts department will be installed in the new two-story and basement service building, 60 x 140 ft., to be erected at Fifth and Exchange Streets, St. Paul, Minn., by the Twin City Motor Car Co., 1428 Harmon Place, Minneapolis, estimated to cost $90,000, with equipment.

A manual training department will be installed in the two-story high school to be erected at Hunter, N. D., estimated to cost $110,000, for which bids will soon be called on a general contract. Joseph Rosatti, Reinecke Building, Fargo, N. D., is architect.

The Delta-Star Electric Co., 2437 Fulton Street, Chicago, manufacturer of high-tension electrical apparatus, will commence the erection of a new one-story plant, 103 x 110 ft., to cost about $45,000.

The Common Council, Brainerd, Minn., will soon call for bids for an electric generator, engine and auxiliary power equipment for the municipal pumping plant. L. P. Wolff, 1000 Guardian Life Building, St. Paul, Minn., is engineer.

The Ford Motor Co., Highland Park, Mich., will build a hydroelectric generating plant at the high dam, Mississippi River, between St. Paul and Minneapolis, Minn., estimated to cost about $2,000,000. It will be used in connection with a new assembling plant to be erected in this district.

A manual training department will be installed in the high school to be erected at Benkelman, Neb., estimated to cost $100,000. An architect will be selected soon. The Board of Education is in charge.

The Rath Packing Co., Waterloo, Iowa, is completing plans for a new five-story cold storage and refrigerating plant, 90 x 100 ft., estimated to cost $150,000, including machinery. Henschien & McLaren, 37 West Van Buren Street, Chicago, are architects.

A manual training department will be installed in the two-story and basement high school to be erected at Latham, Ill., estimated to cost $80,000. John Zimmer, 217 Court Street, Pekin, Ill., is architect.

The Twin City Forge & Foundry Co., Stillwater, Minn., wants to buy an electric hoist, 3 to 5 tons, 50 to 80-ft. boom guyed swinging derrick, 60-cycle, 3-phase, 220 or 440 volts.

Milwaukee

MILWAUKEE, March 5.

CONVERSION of inquiries into orders is proceeding satisfactorily, and while individual sales of machine tools are small and of a scattering nature, the aggregate is moderate and is maintaining the volume of the average week since the first of the year. Builders of milling machines, a distinct feature of this production center, are falling behind on deliveries of special types, but as a rule are still able to make prompt shipment of standard machines. Automotive industries appear to be more interested than ever in multi-purpose tools. Foundries and machine shops are increasingly busy and activity is expanding among manufacturers of metal products. Buyers manifest considerable interest in used tool offerings but practice keen discrimination in making selections.

The Western Leather Co., 878 Marshall Street, Milwaukee, is taking bids through Cahill & Douglas, consulting engineers, 217 West Water Street, for furnishing and installing two 150-hp. water tube boilers and one 150-kw. direct-connected generating unit for an addition to its steam generating plant.

The Waupun, Wis., water and light commission is asking bids until March 15 for the erection of an 80,000-gal. steel tank mounted on a 77-ft. steel tower, and for a new 60,000-gal. steel tank to be mounted on an existing stone tower. Later, bids will be taken for additional power plant and pumping equipment. W. G. Kirchhoffer, consulting engineer, Madison, Wis., is in charge.

The Universal Milking Machine Co. of Waukesha, Wis., has been organized under the laws of Wisconsin with an authorized capital stock of $400,000 to manufacture automatic milking machines and other dairy appliances. It is a reorganization of an Ohio corporation of similar title which will transfer its works and headquarters from Columbus to Waukesha as soon as a new factory and machine shop, estimated to cost $75,000, can be erected. Present equipment will be supplemented materially. John A. Schmitt is president and general manager.

The Green Bay Foundry & Machine Works, Green Bay, Wis., is preparing to enlarge its plant by the erection of additions to the casting shop as well as the machine room to provide much needed capacity for manufacturing special equipment for paper mills, packing plants, municipal machinery, etc. The investment in buildings and machinery will be about $50,000. R. A. North is president and general manager.

The North American Casket Co., Fox Lake, Wis., has been incorporated in Wisconsin with $60,000 capital stock to take over the business of the Minnesota corporation of similar name which has moved its plant and headquarters from St. Paul, Minn., to Fox Lake. A new building has been erected and final purchases of machinery are now being made. Both metal and frame caskets, and the hardware for each type will be manufactured. H. H. Howard, G. L. Weisel and W. O. Connell are the principals.

Ben Adelman, 1073 Sherman Boulevard, Milwaukee, will build a $65,000 laundry plant at Twenty-ninth and Vliet Streets. It will be two stories, 80 x 100 ft., with a separate boiler house, 35 x 37 ft., requiring one 150-hp. water tube boiler, a 75-hp. generator unit and other equipment for which inquiry is now being made. The work is in charge of George Zagel & Bro., architects, 144 Oneida Street.

The Badger Foundry Co., Racine, Wis., manufacturer of gray iron castings, has increased its capital stock from $100,000 to $200,000 to finance proposed extensions of the plant and business.

The Reliance Foundry Co., Slinger, Wis., P. O. Schleisingerville, Wis., which has just been incorporated with $25,000 capital, is renovating and enlarging an existing shop and will manufacture gray iron and semi-steel castings. It will be operated as a general jobbing foundry but will specialize in semi-steel castings for air, automotive, Diesel engine, pump and other high pressure machinery, and tire molds, gear blanks, die castings, etc. James H. Wilkins, Milwaukee, is in general charge.

The Board of Education, District No. 1, West Bend, Wis., is asking bids until March 27 for the construction of a two-story high school, 160 x 200 ft., with a separate boiler house and power plant, 30 x 50 ft., and provision for manual training. The architects are Foeller, Schober & Stephenson, Green Bay, Wis. F. W. Bucklin is secretary of the board.

The Scolding Locks Hairpin Co., Appleton, Wis., which completed a new factory at Appleton Junction, Oct. 1, has contracted for the construction of two additional production units, with electric motor drive, and is making other improvements, the total cost of which is about $20,000. O. P. Schlafer is president.

The Kools Mfg. Co., Appleton, Wis., which manufactures mechanical vegetable peeling machines, etc., and operates in a part of the works of the Appleton Motor Truck Co., is preparing to enlarge its space and install more production equipment. J. L. Johns was elected president at the annual meeting, Edward Kools becoming vice-president. William Kools is secretary and treasurer.

The Chicago & Northwestern Railroad Co., Chicago, has announced its intention to build a new 20-stall roundhouse and general repair and service shop at Watersmeet, Mich., to replace existing obsolete structures. The expenditure will be about $35,000.

S. F. Bowser & Co., Milwaukee, have been incorporated under the laws of Wisconsin with an authorized capitalization of $6,000,000 by the owners of the corporation of similar name at Fort Wayne, Ind. The Wisconsin corporation will take over the Milwaukee properties acquired about 18 months ago and consisting of the plant and business of the Richardson-Phenix Co., 122 Reservoir Avenue, manufacturing automatic lubricating devices, oil separators, etc. Until now the Milwaukee interest has been known as the Richardson-Phenix Division.

The Appleton, Wis., Board of Industrial Education expects to be ready in April to ask bids for the construction of two junior high and vocational training schools, each estimated to cost $225,000, and designed by Perkins, Fellows & Hamilton, architects, 814 Tower Court, Chicago. The structures will be duplicates, erected on distinct sites at the East and West ends of the city. The board probably will not be ready for equipment bids until next fall. Henry Reuter is president of the board.

Cincinnati

CINCINNATI, March 5.

THE St. Louis-San Francisco Railroad placed orders for a number of tools with local manufacturers the past week and is said to have covered for part of its requirements in other manufacturing centers. Buying will be continued until the entire list is completed. This was the outstanding purchase. A list has been issued by the Union Pacific Railroad for a number of heavy tools. The Chesapeake & Ohio Railroad is expected to come into the market shortly for about $350,000 worth of machine tools. Buying during the week was from widely scattered points and was well up to the average of the past few weeks, with one and two machines constituting the bulk of the orders. The coal mining districts of West Virginia and Kentucky are expected to furnish quite a volume of business this year, and a number of orders have already been booked from this source. The automotive industry is also buying steadily, and with railroad business now under negotiation and in prospect the machine-tool industry is looking forward to a very successful year. Special machinery manufacturers report orders heavy and some of the shops which have been catering to this branch for the past two years have found it very profitable.

While little actually is heard of export orders, it is said that negotiations are now being carried on with American manufacturers for the purchase of machinery to cover orders placed with German manufacturers. Much improvement is reported in the demand for wood-working and road-building machinery, and agricultural implement manufacturers are steadily increasing forces to take care of orders. A paper-making machinery manufacturer in this district reported an order for $100,000 worth of machinery for export to China. An order was also booked for about $20,000 worth of machinery for Great Britain.

The Williamson Heater Co., Cincinnati, has awarded contract for the erection of a factory to replace the one recently destroyed by fire. Several smaller buildings have already been erected. The company has been a purchaser of machinery, including a large number of punch presses used in manufacturing furnaces and clothes dryers. A. W. Williams is president.

The Witt Cornice Co., Cincinnati, manufacturer of galvanized ware, has purchased property on Patterson Street and is preparing for the erection of a new plant. J. W. Witt, president, advises that nothing will be done in the immediate future, however, the purchase being made at this time to be sure of having the site when needed.

The Kirk & Blum Mfg. Co., Cincinnati, sheet metal contractor and manufacturer of sheet metal specialties, has been incorporated with a capitalization of $250,000. The company does not contemplate any extensions at present, the incorporation being made for the purpose of taking into the firm a number of employees who have been connected with it for many years.

The Andrews Steel Co., Newport, Ky., will build a carpenter and tin shop to replace the one destroyed by fire last week. The loss, including machine-tool equipment, will amount to $20,000. Work will be pushed to completion on the new shop and some machinery will be needed.

The Cincinnati Victor Co., Cincinnati, has been organized to take over the Reading Road plant of the Corcoran-Victor Co., recently merged with the Thomas J. Corcoran Lamp Co. It will manufacture automobile accessories and hardware specialties. C. L. Harrison heads the board of directors.

The plant of the Bromwell Brush & Wire Goods Co., Cincinnati, manufacturer of wire brushes and other wire products, was damaged to the extent of $150,000 by fire Feb. 24. No decision has been made as to whether or not the plant will be rebuilt.

The Ohio State Stove Co., Columbus, Ohio, has awarded contract to the Truscon Steel Co. for a building opposite the present plant on Ruttles Avenue. It will be 90 x 255 ft., one story, with provision for additional floors later. W. B. Thomas is president.

The Robert Berner Structural Steel Co., Indianapolis, has been incorporated with a capitalization of $150,000 by Robert Berner, formerly of the Hetherington & Berner Co. It has taken over the property of the Haywood Foundry Co., South Harding Street, which will be remodeled and enlarged as a fabricating shop. The company will also install machine-tool equipment, including drilling, punching and shearing machines.

The foundry of the Chandler & Taylor Co., Indianapolis, was destroyed by fire Feb. 24 with a loss of $150,000. It will be rebuilt, according to W. M. Taylor, president, in the immediate future. Operations in the machinery manufacturing and engine-building plants will not be interrupted, as necessary castings will be secured from outside foundries.

The Gulf States

BIRMINGHAM, March 5.

THE Standard Spring & Axle Co., 2614 Main Street, Dallas, Tex., has awarded contract to Gustave Henderson, Dallas, for a one-story addition, 50 x 100 ft., to cost about $25,000. The installation will include heat-treating furnaces for steel spring work. L. K. Weaver is president and treasurer.

The Citronelle Light & Power Co., Citronelle, Ala., is planning the erection of a new one-story ice-manufacturing and refrigerating plant. Bids will soon be asked on equipment.

H. W. Dexter, 309 Bisbee Building, Jacksonville, Fla., is inquiring for a 30 to 35-ton locomotive, Mogul type, for logging service; also for an 80 to 100 hp. boiler, horizontal tubular return type.

The W. O. Arzinger Machinery Co., Birmingham, machinery dealer, is in the market for heavy duty lathes, 14 to 26 in.; also for a 4-head planer, 72 to 86 in.

The Texas Corrugated Box Co., Dallas, Tex., recently organized with a capital of $150,000 by J. H. Oppenheim, New Orleans, and associates, has acquired a building at the Love Aviation Field, 135 x 350 ft., and will remodel the structure for the manufacture of corrugated paper products. W. S. Liebman, Dallas, is manager.

The West Texas Utilities Co., Stamford, Tex., will commence the erection of a new auxiliary power plant to cost $50,000.

The City Council, Fort Worth, Tex., will issue bonds for $250,000, the proceeds to be used for extensions in the city power plant and system, including the installation of additional equipment.

The Bureau of Yards and Docks, Navy Department, Washington, has plans for the installation of an electrically operated pumping plant, with trestle, piping and equipment, at Pensacola, Fla., and will soon call for bids under specification 4793.

The Common Council, Rayne, La., will take bids until March 20 for a municipal electric power plant and extensions in the waterworks, including 300-hp. oil and engine electric generator unit; motor-driven centrifugal pumping machinery; booster pump; switchboard, and auxiliary machinery. The J. B. McCrary Co., Atlanta, Ga., is engineer.

The Eureka Coal & Clay Co., Athens, Tex., has acquired clay properties on the Easley farm, near Athens, and will install a complete mining plant, including steam shovel, conveying machinery, drag-line equipment, with power house and machine shop. The company has recently been organized with a capital of $50,000.

The West Florida Power Co., Tallahassee, Fla., is completing plans for a hydroelectric power plant on the Ocklocknee River, estimated to cost $250,000. Mees & Mees, Charlotte, N. C., are engineers.

The Harston Sand & Gravel Co., 302 Insurance Building, Dallas, Tex., recently organized with a capital of $120,000, is planning for the installation of a mechanical washing and screening plant on 200 acres. A power house will be built and conveying and other machinery installed. Daniel Harston is president, and W. E. Callahan, secretary and treasurer.

Fire, Feb. 22, destroyed a portion of the plant of the Love Lumber Co., Poplarville, Miss., including planing mill, power house and other structures, with loss estimated at $100,000 including machinery. It is planned to rebuild.

The Birmingham Engine & Machinery Corporation, Bir-

mingham, machinery dealer, is inquiring for a stationary engine, Corliss type, about 18 x 36 in.

The Common Council, New Albany, Miss., will install new equipment at the municipal electric power plant to cost $25,000.

The Southern Utilities Co., Cocoa, Fla., has acquired the local electric light and power plant of the Cocoa Electric Light & Ice Co. Plans are under way for extensions and improvements, including the installation of additional machinery.

F. I. Derby, York, Ala., operating a local wood-working plant, is perfecting plans for the establishment of an ice-manufacturing and refrigerating plant. Inquiries will soon be made for machinery.

The Central Alabama Lumber Co., Race Street and Jeff Davis Avenue, Selma, Ala., recently reorganized, has plans under consideration for extensions and the installation of additional machinery. W. R. Rouse is general manager.

The Common Council, Wauchula, Fla., will install two new motor-driven pumping engines at the waterworks, with a daily capacity of 200,000 and 300,000 gal., respectively, and auxiliary power machinery.

The Central South

ST. LOUIS, March 5.

PRELIMINARY plans are under consideration by the Kansas City Refining Co., First and Troup Avenues, Kansas City, Mo., for a new oil refinery in the vicinity of Eureka, Kan., to cost approximately $200,000.

The Koken Companies, Inc., 2528 Texas Avenue, St. Louis, manufacturer of iron and enameled iron barbers' chairs and furniture, will commence the erection of a branch plant at Oakland, Cal. Walter F. Koken is president.

America's Best Trailer Truck Co., Inc., Memphis, Tenn., recently organized with a capital of $1,000,000, has purchased a local building and will remodel the structure for the manufacture of trailer trucks for factory and other service. Joseph Newberger is president and T. M. White, general manager.

The Colvert Ice Co., Ardmore, Okla., will build a two-story and basement ice-manufacturing plant, 60 x 110 ft., to cost about $50,000 with machinery. J. B. White, 101½ West Main Street, is architect.

Officials of the Moloney Electric Co., 1149 South Seventh Street, St. Louis, manufacturer of transformers and other electrical equipment, have organized the Moloney Electric Co. of Canada, Ltd., with a capital of $500,000, to operate a Canadian plant. The tractor plant of the Canadian Fairbanks-Morse Co., Sterling Road, Toronto, has been purchased by the new company for about $100,000 and will be equipped at once for the same specialties produced by the parent company.

The Cumberland Power Co., Bridge Building, Nashville, Tenn., has purchased the plant and property of the Livingston Light & Power Co., Livingston, Tenn. Plans are in progress for extensions and improvements, including the installation of additional machinery. Bids will soon be asked.

The Southern Potteries Co., Erwin, Tenn., has tentative plans for an addition, ultimately to include a complete seven-kiln unit, estimated to cost more than $100,000 with machinery. Charles W. Foreman is head.

The Frictionless Metal Co., Richmond, Va., has leased a three-story building at Cass Avenue and Collins Street, St. Louis, which will be remodeled for the production of Babbitt metal. The present factories at Richmond and Montreal will be removed to the new site, which will become company headquarters. C. W. Bourne is president.

The Texas-Pacific Refining Co., Wynnewood, Okla., is perfecting plans for the erection of a new refinery, estimated to cost $90,000.

The Phillipsburg Ice & Cold Storage Co., Phillipsburg, Kan., will build a new one-story ice-manufacturing plant near the Rock Island Railroad station, 50 x 100 ft., to cost $65,000 with equipment.

The Acme Mfg. Co., Chattanooga, Tenn., manufacturer of cedar chests, has preliminary plans under way for enlargements to double the present capacity. Additional machinery will be installed.

The Knoxville Rubber Co., East Jackson Avenue, Knoxville, Tenn., is planning the installation of machinery in a local building to manufacture automobile tires and other rubber products. Inquiries are being sent out for equipment. W. M. Simpson is head.

The Tymo Utility Co., Paducah, Ky., care of William Tyehead, is considering plans for the construction of a one-story foundry and mechanical assembling plant.

The Cherokee Brick Co., Knoxville, Tenn., recently organized with a capital of $125,000, has acquired 25 acres in the Chestnut Ridge section and plans new works with a daily capacity of 40,000 brick. A power house and machine shop will be built. The plant will cost approximately $70,000. Roy Newman is president, and J. C. Wright, secretary and treasurer.

The Consumers' Light & Power Co. Ardmore, Okla., will commence the construction of a one and two-story power plant, with ice plant and cold storage department adjoining, to cost $80,000.

A manual training department will be installed in the new two-story and basement high school, to be erected at Sabetha, Kan., for which bonds for $95,000 have just been voted. William H. Saylor & Co., 306 Mutual Building, Kansas City, Mo., are architects and engineers.

The Wyatt Mfg. Co., Salina, Kan., manufacturer of tractors, farm implements, etc., will install a power lathe and other equipment.

The Duncan Machinery Co., Knoxville, Tenn., has inquiries out for a 20 to 24-in. double surface planer and matcher, Fay & Egan, or similar type; also for 3,000 ft. of wire rope, ⅝ and ¾-in. sizes.

A manual training department will be installed in the new junior high school to be built at Wellington, Kan., two and three stories, estimated to cost $300,000. T. W. Williamson & Co., 312 Central Bank Building, Topeka, Kan., is architect.

The Anderson Box & Basket Co., P. O. Box 28, Henderson, Ky., has acquired a local building, 115 x 180 ft., and is preparing a list of machinery for installation. Production will be devoted to factory hand-trucks, boxes, and shipping cases. The works will cost about $45,000. G. O. Letcher is general manager.

A manual training department will be installed in the new high school to be erected at Cameron, Mo., estimated to cost $85,000. The Board of Education is in charge.

A vocational department will be installed in the new three-story and basement high school, 240 x 260 ft., to be erected at Oklahoma City, Okla., estimated to cost $600,000, for which ground will be broken at once. William B. Ittner, Board of Education Building, St. Louis, is architect.

Detroit

DETROIT, March 5.

ROEHM & DAVISON, 6452 Mack Avenue, Detroit, manufacturers of steel products, have awarded contract to Everett Winters, Book Building, for a two-story addition, 150 x 153 ft., estimated to cost $100,000 including machinery.

The Tirrell Mfg. Co., Bridgman, Mich., manufacturer of spraying equipment, has tentative plans for an addition, to double, approximately, the present capacity. It will cost $45,000 with equipment.

The Economy Boiler Co., Ann Arbor, Mich., is planning the erection of a one-story addition, including the installation of considerable new equipment.

The Department of Purchases and Supplies, Marquette Building, Detroit, has inquiries out for a 3-motor electric pillar crane, for the municipal street railroad system.

A manual training department will be installed in the new two-story and basement high school, 60 x 115 ft., at Battle Creek, Mich., estimated to cost $175,000. H. Mead, Michigan Trust Building, is architect, and will take bids on a general contract before the close of the month.

The Ideal Engine Works, Inc., Lansing, Mich., is arranging for the discontinuance of manufacture of stationary engine and parts, and will devote its entire facilities to the production of motor-driven lawn mowers and parts.

A manual training department will be installed in the proposed new high school to be erected at Bad Axe, Mich., estimated to cost $150,000. A special election has been called to vote bonds. The Board of Education is in charge.

William H. Reid, city manager, Bay City, Mich., will take bids until March 12 for two 10,000,000-gal. turbo-centrifugal pumps, with condenser and auxiliaries, and one 5,000,000-gal. motor-driven centrifugal pump for the municipal waterworks. Frezier, Sheal and Ellms, B. F. Keith Building, Cleveland, are engineers.

The Litcher Electric Co., 41-43 Market Avenue, Grand Rapids, Mich., manufacturer of electric equipment, has awarded contract to William Baker & Son, 1324 College Avenue, for a three-story and basement building to replace its works recently destroyed by fire. It will cost $40,000. C. J. Litcher is president.

The Marshall Furnace Co., Marshall, Mich., has commis-

sioned A. B. Chanel, 728 Post Building, Battle Creek, Mich., architect, to prepare plans for a one-story addition, 130 x 250 ft., to replace the structure recently destroyed by fire. The new building will cost $50,000 and bids will be called about March 15. F. K. Berry is president.

A manual training department will be installed in the proposed new high school to be erected at Grand Ledge, Mich., estimated to cost $165,000. J. N. Churchill, Oakland Building, Lansing, Mich., is architect.

The Wolverine Carton Co., Grand Rapids, Mich., recently organized, has leased the one-story plant, 70 x 450 ft., formerly occupied by the Lorraine Motor Co., bankrupt, and will equip it for immediate production.

Indiana

INDIANAPOLIS, March 5.

THE Dudlo Mfg. Co., Fort Wayne, Ind., manufacturer of electric coils, wire, etc., is considering plans for an addition to cost $65,000. It will replace a portion of the works recently destroyed by fire.

C. N. Braun, 820 Calhoun Street, Fort Wayne, Ind., has inquiries out for box machinery and wood-working equipment.

The McQuay-Norris Co., St. Louis, manufacturer of pistons, piston rings, etc., has acquired the plant and business of the Victor Bearings Co., Indianapolis, specializing in the production of crank-shaft and connecting rod bearings, and organized about a year ago. It is planned to continue operations at the Indianapolis works and arrangements will be made for extensions, to include the installation of additional equipment. W. K. Norris is president.

The Cleveland Metal Products Co., Platt Avenue, Cleveland, has abandoned plans for a branch plant on property acquired some time ago at Meridian Street and the Belt Railway, Indianapolis, and has arranged for the sale of the site.

A manual training department will be installed in the new two-story boys' Catholic high school, 196 x 235 ft., to be erected on Lincoln Avenue, Evansville, Ind., for which bids on a general contract are being received until March 14. It will cost about $200,000. Clifford Shopbell & Co., Furniture Building, are architects.

A manual training department will be installed in the two-story and basement high school, 75 x 125 ft., to be erected at Mooresville, Ind., estimated to cost $150,000. W. H. Garns, Fletcher Savings & Trust Building, Indianapolis, is architect.

The City Council, Decatur, Ind., is planning for extensions in the municipal electric power plant and waterworks, to include the installation of new boilers, stokers and auxiliary machinery, estimated to cost $40,000.

The Fort Wayne Oil & Supply Co., 229 East Columbia Street, Fort Wayne, Ind., is in the market for a centerless grinder for handling bars up to 1⅛-in. diameter, 60 in. long.

Motors, automatic machinery and other equipment will be installed in the mill to be erected by the Pinnell Lumber Co., Indianapolis, at Fifty-second Street and the Monon Railway, estimated to cost $75,000.

The Revere Motors Co., Logansport, Ind., recently organized with a capital of $250,000 to take over the local plant of the Revere Motor Car Co., in receivership, has taken title to the property, and plans early operation for the manufacture of automobiles and parts. Improvements will be made in the machinery, including replacements. The new company is headed by Charles E. Barnes, Jesse M. Johnson and Adolph Monsen.

The Pacific Coast

SAN FRANCISCO, Feb. 27.

THE Southwestern Shipbuilding Co., San Pedro, Los Angeles, is having plans prepared for a new oil storage and distributing plant, with capacity of 80,000 bbl., estimated to cost $300,000 with machinery.

The American Can Co., Mills Building, San Francisco, has plans in progress for a four-story, reinforced-concrete addition to its plant at Honolulu, T. H., estimated to cost $200,000 with machinery. All details will be handled by the local engineering department.

The Rawling Mfg. Co., Napa, Cal., care of the Napa Chamber of Commerce, contemplates the erection of a plant for the manufacture of vises and other special hardware products, estimated to cost $30,000. E. H. Brown, secretary and treasurer, is in charge.

The Ford Motor Co., Los Angeles, has awarded general contract to Edwards, Wildey & Dixon, 515 Black Building, for a two-story addition to its assembling plant, 130 x 350 ft., estimated to cost $300,000, with machinery. The equipment installation will approximate $100,000.

The Artificial Ice & Cold Storage Co., Yakima, Wash., is contemplating the erection of a new ice-manufacturing and refrigerating plant to cost $100,000 including machinery.

The United States Refractories Co., San Luis Obispo, Cal., is planning for extensions and improvements to cost about $65,000. Additional equipment will be installed.

The National Ice & Cold Storage Co., Newman, Cal., has acquired property near the station of the Southern Pacific Railroad, and contemplates the erection of a new ice-manufacturing and cold storage plant to cost approximately $100,000.

The Columbia River Paper Mills, Inc., Vancouver, Wash., is perfecting plans for its new plant, estimated to cost $500,000. A power house and machine shop will be built. F. W. Leadbeater is president.

Canada

TORONTO, March 5.

MACHINE-TOOL business for the month of February was marked by a decided improvement over that for the previous month. The automotive industry showed renewed interest during the past month, and some good business was closed for new shops and replacements, and even more active buying on this account is expected during the present month. Several large plants now under construction will be nearing completion in April, and plans are under way for the purchase of machinery and tools. A more active demand is making its appearance for equipment on public works account.

Improved conditions in industrial operations have greatly strengthened the demand for small tools, and while no general increase has been reported in prices, some dealers are under the impression that advances of 10 to 15 per cent will be announced in the near future.

C. Alfred Maguire, mayor, chairman of the Board of Control, Toronto, will receive bids until April 10 for the supply and installation of one 3,000,000 Imperial gal. centrifugal sledge pump and motor.

The Gore Coal Mining Co., Ltd., Shubenacadie, N. S., will construct coal mining bank head and shaft at East Gore, N. S., to cost $25,000. Superintendent, Henry Ollerhead, Cabot Street, Sydney, N. S.

R. A. Foley, resident engineer, care United Gas & Fuel Co., 13 Main Street East, Hamilton, Ont., will receive bids until March 15 for a $2,500,000 plant for the Hamilton By-products Coke Oven Co., Ltd.

The Thompson Motor Supplies, Ltd., 415 Queen Street West, Toronto, is building a one-story factory, 35 x 100 ft., at Acton, Ont., to cost $15,000, and will manufacture automobile parts and accessories.

The planing mills owned by Stuart Brothers, at Aberdeen and Hyde Park Avenue, Hamilton, Ont., were destroyed by fire with loss of $100,000, including equipment. It is expected that the owners will soon rebuild.

The machine shop owned by the La Machine Agricole de Montmagny, Montmagny, Ont., was destroyed by fire with a loss of $30,000.

The Sheet Metal Tools & Hardware Co., Orillia, Ont., has acquired the building formerly occupied by the Fisher Motor Co. and will manufacture hardware specialties, rakes, tools, etc. F. Tissington and J. E. Harvery are partners in the company.

The Gabriel Mfg. Co. of Canada, 107 Front Strret East, Toronto, has started work on a one-story brick factory at 187 Duchess Street, where it will manufacture the Gabriel Snubber, a shock absorber for automobiles.

The Macdonald Mfg. Co., Ltd., 145 Spadina Avenue, Toronto, is building an addition to its tinware plant, 60 x 100 ft., four stories, at a cost of $100,000. No additional equipment will be installed at present.

The Monarch Metal Co., Main Street West, Hamilton Ont., has let the general contract to S. J. White, 165 Main Street East, for the erection of a plant.

The By-Products Coke Ovens, Hamilton, Ont., a subsidiary of the Semet-Solvay Co., Syracuse, N. Y., has secured a 35-acre site on Hamilton Bay and proposes to start work this year on the erection of a plant to cost $2,500,000.

The Western Screen Blind Co., 1330 Montgall Avenue, Kansas City, Mo., is planning for the erection of a one-story addition, estimated to cost $20,000 including equipment.

Plans of New Companies

The Ago Co. of America, Inc., Room 714, 132 Nassau Street, New York, has been incorporated with capital stock of $125,000 to manufacture machinery and parts for shoe production and leather working. It has secured complete rights in the United States for handling the machinery of the Atlas-Werke Co., Leipzig, Germany. The American branch will not undertake to do any manufacturing, at least for some time. George M. Broemler heads the company, and he with A. Schafgan and P. Krumbein are the incorporators.

The American Chain Co., Inc., has been incorporated to acquire the assets and business of the American Chain Co., Grand Central Terminal, New York, to continue the business of the old company as formerly conducted. An offering was made of 350,000 shares of 8 per cent cumulative participating stock of $25 par value. There will also be an issuance of $7,500,000 ten-year 6 per cent debenture bonds. Both issues will be underwritten by Dillon, Read & Co. and Hemphill, Noyes & Co., New York. Application will be made to list both on the New York Stock Exchange.

The General Air Service, Inc., will be the operating branch of the American Investigation Corporation, formed some time ago to look into the feasibility of establishing a Zeppelin line between New York and Chicago similar to those formerly operated with success in Germany. Several months will be consumed in completing the work of organization and survey before operation can be considered. According to S. A. Fahnestock, 14 East Seventy-sixth Street, New York, it is likely that at first engines and parts will be secured by contract under rigid specifications.

The Max Solomon Co., Oliver Building, Pittsburgh, has been incorporated under the laws of Pennsylvania to conduct the iron and steel scrap business hitherto done under the individual name of Max Solomon. Mr. Solomon is president and treasurer of the company and H. S. Page is secretary.

The Pipe Thread Protector Co. of Pittsburgh, Rochester, Pa., has been organized to manufacture pipe thread protectors for tubing, line pipe and casing. H. G. Gallinger, 5715 North Umberland Street, Pittsburgh, is treasurer.

The Raymond Mfg. Co., Ltd., Corry, Pa., recently incorporated, will continue the business of the Raymond Mfg. Co., which has been in existence for many years in the manufacture of wire springs. No change in management or policy was effected. F. M. Raymond is president and F. E. Whittlesey is secretary-treasurer.

The Acme Devices Corporation, care of H. C. Barker, 54 Market Street, Poughkeepsie, N. Y., has been incorporated with capital stock of $50,000 and will manufacture hardware products. Plans are not yet entirely formulated but it is likely that immediate manufacturing will be let out to contract. The incorporators are M. E. and G. E. Parrott and C. S. Titus.

The New England Auto Products Corporation, P. O. Box 1772, New Haven, Conn., has been incorporated with capital stock of $50,000 to manufacture and deal in automobile parts and equipment. Preliminary plans cover only replacement parts, but within four or five months activities will be extended. The company has a plant, and equipment has been installed. The principals are J. E. Schall, C. F. Mitchell and A. L. Perkins, 26 Darien Street, Hartford, Conn.

The Bassick-Alemite Corporation has been organized to acquire the entire outstanding common stock of the Bassick Co., a large Connecticut producer of casters and automobile hardware; also the entire stock of the Bassick Mfg. Co., a Delaware corporation, located in Chicago, manufacturing high pressure lubrication for industrial machinery and automotive vehicles. Each company will continue in its former activities without any change in personnel or management. An offering is being made of $1,250,000 Bassick-Alemite Corporation 7 per cent collateral trust serial gold notes.

The Ranney-Weaver Co., Leader-News Building, Cleveland, has been incorporated by E. C. Ranney and O. L. Weaver for the purpose of operating Cleveland sales offices for the Erie Malleable Iron Co., Erie, Pa.; Fedders Mfg. Co., Inc., radiators, Buffalo, and the Weldless Tube Co., seamless steel tubing, Wooster, Ohio.

The Builders Millwork Co. has opened a plant for general woodworking at Thirty-fifth and Hadley Streets, Milwaukee. John Rauwald is general manager and J. G. Jansen is president. Machinery is now being purchased.

The Luxorad Corporation, care of J. B. Doyle, 30 West Forty-fourth Street, New York, has been incorporated with capital stock of $150,000 and will act in the capacity of fire prevention engineers. The principals are S. H. Hamilton, R. Moore and G. O. Carter. Headquarters will be located in Brooklyn, N. Y.

The Chelsea Steel Products Co., care of T. F. Hyland, 43 Exchange Place, New York, was recently incorporated with capital stock of $25,000 and will manufacture small specialties of iron and steel. The incorporators are E. H. Caterson, E. B. Kalbacher and J. M. Maher.

The Industrial Can & Metal Stamping Corporation, care of Otterbourg, Steindler & Houston, 200 Fifth Avenue, New York, has been incorporated with capital stock of $50,000 and will engage in the manufacture of stamped metal goods and other metal products. Considerable work is yet to be done in organization and it is unlikely that operations will be considered before a couple of months. The incorporators are E. M. Steindler, C. A. Hulston and N. Fendrick.

The Biltwell Auto Truck & Specialty Co., care of Herman Rosenblum, 116 Nassau Street, New York, has been incorporated with capital stock of $50,000 to manufacture motor trucks and parts. Nothing definite has yet been decided in the way of manufacturing, but this matter will be taken up immediately after the incorporators' meeting to be held next week. The principals are L. Klotz, R. Meyer and M. Rosenblum.

The Automatic Shoe Shiner Corporation, 2315 Andrews Avenue, New York, care of H. L. Ellis, has been incorporated through the Charter Service Corporation, 149 Broadway, under Delaware laws, with capital stock of $1,050,000, to manufacture shoe shining machinery. The company is not yet in a position to disclose its plans. The principals are H. L. Ellis, W. H. Mayhar and E. F. Gray.

The Aborn-Harper Steel & Engineering Corporation has been organized to combine the E. A. Harper Tool & Supply Co. and the Aborn Steel Co., and will have offices at 22-24 Clarke Street, New York. E. A. Harper is president and directing head of the new corporation.

The Gallmeyer & Livingston Co., Grand Rapids, Mich., has been incorporated to take over the assets and business of the Valley City Machine Works, the Grand Rapids Grinding Machine Co. and the Union Machine Co. All assets and liabilities are transferred to and assumed by the new company. It is planned to build immediately a new plant in which the combined interests can be carried on as a whole. This will provide a considerable increase in capacity. The officers are Christian Gallmeyer, president; S. Owen Livingston and W. H. Gallmeyer, vice-presidents; B. C. Saunders, secretary, and Charles H. Gallmeyer, treasurer.

The H. M. Wade Mfg. Co., Charlotte, N. C., has been incorporated with capital stock of $250,000 to take over the business of a firm which has been in existence for about 20 years in the manufacture of bank and store fixtures. The incorporators are H. M. and E. H. Wade and I. R. Jordan, all of Charlotte.

The Simmons Co., Kenosha, Wis., manufacturer of metal bedsteads and furniture, moved the general offices of its central division from Kenosha to 230 East Ohio Street, Chicago, effective March 1. At the same time the executive offices were moved to New York.

Trade Changes

W. R. Bennett has disposed of his interest in the business which he formerly conducted under the name of Bennett Metal Treating Co., Elmwood, Conn., and has severed his connection with the company. The plant, business and good will have been acquired by the Bennett Metal Treating Co., which will continue the business under the management of John P. German, who has been for eight years with the Scovill Mfg. Co. in charge of the hardening department. The company is equipped for hardening tools of all kinds, including casehardening, packhardening, deep carburizing, annealing, and general heat treating of steel parts of every kind.

I. M. Jacobson & Sons Co., metals, 70-72 Catherine Street, Detroit, has moved its general offices to 5533 Woodward Avenue, that city.

Commencing March 1, the Hjorth Lathe & Tool Co., 73 Cornhill, Workman's Cooperative Bank Building, Boston, will be located at 10 Tremont Street, that city.

The Brace-Mueller-Huntley Co., has been appointed sales representative of the Titusville Forge Co., Titusville, Pa., in New York State outside of New York City and also in Northern Pennsylvania.

The E. R. Hensel Steel & Copper Co., Security Building, St. Louis, for 28 years in business as a seller of iron and steel rolling mill products has established a Kansas City office at 622 Reliance Building, that city.

The C. G. Spring Co., Kalamazoo, Mich., has moved its general office to Detroit in addition to having established a manufacturing and plating plant there recently. Christian Girl, president of the company, has announced that there is no intention of moving the main plant to Detroit at present.

The Ideal Engine Works, Lansing, Mich., is planning gradually to decrease the production of stationary engines and to devote its full manufacturing facilities to the production of the Ideal power mower.

Haverstick & Co., Inc., mine, railroad and factory supplies, formerly at 66 Exchange St., are now occupying their new building at Ford and Spring Streets, Rochester, N. Y. Twice the floor area of the old quarters is available in the new building.

STEEL AND INDUSTRIAL STOCKS

General Price Trend Upward—Steel Common Gives Warning Note

Events last week only intensify the belief in the genuineness of the revival. Steel and industrial stocks throughout the list have shown quick response to the increased activity and to the rise in commodity prices. Premiums are again the vogue and the list has taken account of that as well. News during the week was uniformly good, but in this there is often a warning. United States Steel's abrupt week-end reaction, after leading the market for nearly a week and after making a new high, is a keynote to what may ensue if over-speculation displaces good sense. There are parallels in the crises of 1907 and 1895 which show the tendency to overdo on a recovery such as this. Great activity prevailed. Despite pressure the trend was upward and is still definitely upward. The pause in Steel was only a ripple from the general market; this issue, many believe, will go much higher before the bull efforts are spent. American Can and Lima Locomotive figured in new highs at midweek. Bethlehem B and Republic showed rising strength.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

	Low	High		Low	High
Allis-Chalmers...	48⅞	51	Int. Har.	94	95⅞
Allis-Chal. pf...	95	96	Int. Har. pf....	114¼	114½
Am. B. S. & Fdy.	76⅞	78	Lima Loco.	66⅛	71⅜
Am. B.S. & F. pf.	110	..	Midvale Steel...	28¾	32
American Can...	96	104½	Nat.-Acme	13½	16¼
Am. Can pf.....	113	114⅞	Nat. En. & Stm..	67⅞	69
Am. Car & Fdry.	180	186¾	Nat. En. & S. pf.	101	..
Am. Car & F. pf.	123⅛	..	N. Y. Air Brake..	35¼	37
Am. Locomotive.	125	127½	Nova Scotia Stl.	29¼	29⅞
Am. Loco. pf....	121	..	Otis Steel	10¼	11½
Am. Radiator...	82½	83	Otis Steel pf....	62	..
Am. Steel Fdries.	37½	39⅝	Pressed Stl. Car	63	66
Am. Steel F. pf..	104	104½	Pressed Stl. pf..	90	..
Baldwin Loco...	135⅝	139½	Ry. Steel Spring.	114½	118⅜
Bald. Loco. pf..	113	115⅞	Ry. Stl. Spg. pf..	118	119¼
Bethlehem Steel.	64	70	Replogle Steel...	27¾	29⅝
Beth. Steel Cl. B	65¼	71⅞	Republic	55¼	61½
Beth. Stl. 8% pf.	109½	111	Republic pf.....	93⅞	94⅞
Beth. St. pf. new	95½	96¼	Sloss	49	54¼
Brier Hill	18¼	19	Sloss pf.	79	81½
Br. Em. Steel...	9	9⅞	Steel of Canada.	74	76⅞
Br. Em. Stl. 1 pf.	69	..	Superior Steel...	32	32½
Br. Em. Stl. 2 pf.	25½	..	Superior St. 1 pf.	99¾	..
Chic. Pneu. Tool	87	89⅝	Transue-Williams	34	..
Colo. Fuel	28¾	30¼	Un. Alloy Steel..	35½	36½
Crucible Steel...	77¼	83¼	U. S. Pipe.....	31	34½
Crucible Steel pf.	94	94½	U. S. Pipe pf...	70	71½
Deere, pf.	72	72½	U. S. Steel.....	106¼	108⅞
Gen. Electric....	185¼	188¾	U. S. Steel pf...	120	121¼
Gt. No. Ore, Cert.	33¼	35½	Vanadium Steel.	40½	43¾
Gulf States Steel	89⅝	94¼	Va. I., C. & Coke	63	64
Inland Steel.....	46½	47	W'house Air Br.	116	119½

Interstate Iron & Steel Co. Report

The Interstate Iron & Steel Co. reports a profit of $609,539, after taxes and depreciation, for the year ended Dec. 31, 1922, and net income of $231,574, after interest and other charges. This is equivalent to $11.24 per share on the 7 per cent preferred stock on which cumulative dividends have been unpaid since Dec. 1, 1921.

President S. J. Llewellyn in his statement to the stockholders said: "In view of the continued adverse conditions affecting all steel companies during the first nine months of 1922, it is exceedingly gratifying to your directors to be able to report that greatly improved conditions obtaining in the last quarter of 1922 left a net profit of $231,574."

Vanadium Corporation Finances

The Vanadium Corporation of America shows net income of $295,250, after charges and depreciation, in its 1922 report. This compares with a net loss of $427,546 in the previous year. Net working capital as of Dec. 31 last, was $3,797,255, of which $801,842 was in cash. J. Leonard Replogle, chairman of the board, told the stockholders that "more than 60 per cent of all the heavy locomotives purchased last year had vanadium steel specified in important motion and reciprocating parts.

"With the steady improvements in the steel business now under way and continued progress in the extension of the use of vanadium in the various specialized industries where alloy steels are required, there is every reason to believe that a good year is in prospect."

Sharon Steel Hoop Co. Report

The Sharon Steel Hoop Co., Sharon, Pa., reports a loss of $832,562 from operations in 1922, after interest and charges bringing the final deficit carried to the balance sheet $3,291,340. President S. P. Ker informed stockholders at the yearly meeting that gross sales last year were $12,300,000 on 222,000 tons of products shipped. Gross profit from operations was $571,305, while the idle time expense account was placed at $352,618. The company charged off $561,353 for depreciation and renewal of plants. The balance sheet shows gross assets of $28,172,646. Current assets are $5,265,992 against current liabilities of $3,498,911. Reserves for depreciation and renewals are $4,383,903, while miscellaneous reserves are $108,650. The company has $14,319,700 outstanding of a $15,000,000 common stock authorization, $50 par value; $1,002,400 of a $1,500,000 preferred stock issue and $4,750000 of 8 per cent bonds.

Improvement in Railway Steel Spring Co.

The Railway Steel Spring Co. reports for 1922 a surplus after dividends of $302,293 against a deficit of $437,365 in the preceding year. The profit and loss surplus on Dec. 31 last was $12,771,283 against $12,468,990 on Dec. 31, 1921. President F. F. Fitzpatrick told the stockholders that the success of the company still depends almost entirely upon the buying power of the United States railroads. He also stated that for the purpose of economy the wheel works of the company will be discontinued and steel-tired wheels will be manufactured at its tire mills. The wheel-making machinery has been removed from the works at Depew, Hudson, Scranton and Pullman to the tire mills at Latrobe and Chicago Heights. Properties at the former wheel works will be disposed of as rapidly as possible. The usual quarterly dividend of 2 per cent was declared on the common stock.

Industrial Finances

The report of the Moon Motor Car Co., St. Louis, for 1922, shows net earnings of $913,883 on the sale of passenger cars, parts and accessories amounting to $6,877,159. In 1921, the company earned $120,051 on sales of $3,505,880.

At the annual meeting of the Billings & Spencer Co., Hartford, Conn., stockholders authorized an issue of $600,000 7 per cent 10-year bonds, which will be sold to replace outstanding obligations and to strengthen the working capital of the corporation.

The Hunt-Spiller Mfg. Corporation, Boston, gun iron castings, has sold $600,000 7 per cent cumulative preferred stock, which is subject, beginning March 1, 1924, to a sinking fund amounting to 10 per cent of the annual net profits after all taxes and preferred stock dividends have been paid. The new stock is callable as a whole or in part at $110 and accrued dividends at any time on due notice.

J. P. Morgan & Co., New York, as sinking fund trustees have completed the drawing of $2,293,000 United States Steel Corporation ten-sixty-year 5 per cent sinking fund bonds for redemption May 1, at $110 and interest. To date the corporation has redeemed $32,343,000 of this issue, and has $167,657,000 outstanding, the original issue having been $200,000,000.

The Otis Steel Co. reports a net loss of $427,659 in 1922, after taxes and charges, as against a net loss of $5,189,543 in 1921. Operating profit amounted to $82,056, compared with $1,288,395 in the previous year. The balance sheet at the close of the year showed $1,764,882 on the liabilities side in accounts payable.

Total earnings of the British Empire Steel Corporation, Montreal, Que., as shown in its report for the year ended Dec. 31, 1922, were $2,917,275, a marked decline from the report for the period from April 16 to Dec. 31, 1921, showing earnings of $4,416,451. The receipt of $4,000,000 from the Dominion Government swelled the income to $6,917,275, which after interest and depreciation diminished to $1,344,298 available for dividends. Previous surplus brought the profit and loss balance to $1,024,199.

The Gibb Instrument Co., Bay City, Mich., maker of electric welding equipment, has increased its authorized capital stock from $75,000 to $175,000. Of the increase $40,000 has been sold at par to provide increased manufacturing facilities and to take care of a rapidly increasing business.

The Chisholm Shovel Co., Cleveland, has been placed in receivership on application of the E. W. Bliss Co., which has claims of $15,427 against the shovel company. Wilson B. Hickox has been named as receiver. The Chisholm company denies that it is insolvent.

The White Motor Co., Cleveland, during 1922 earned $3,700,000, after deducting all charges except dividends. During the preceding year, the company sustained an operating loss of $2,346,824. Gross sales last year amount to $37,000,000, as compared with $30,320,938 in 1921. The company's current assets are $21,068,000, current liabilities $5,586,000, and surplus $4,400,000.

The Chandler Motor Car Co. reports total income of $3,995,778 for 1922, against $1,948,530 in the previous year. After taxes and other charges the equivalent of $6.09 per share was available for the 280,000 shares of stock outstanding, against $0.14 in 1921.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of items the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	
Refined iron bars, base price	3.34c.
Swedish bars, base price	7.50c.
Soft steel bars, base price	3.34c.
Hoops, base price	5.19c.
Bands, base price	4.14c.
Beams and channels, angles and tees 3 in. x ¼ in. and larger, base	3.44c.
Channels, angles and tees under 3 in. x ¼ in., base	3.34c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	3.35c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	3.55c.
Toe-calk, ½ x ⅜ in. and larger	4.30c.
Cold-rolled strip, soft and quarter hard	7.00c. to 8.00c.
Open-hearth spring steel	4.35c. to 7.00c.
Shafting and Screw Stock:	
Rounds	4.20c.
Squares, flats and hex	4.70c.
Standard tool steel, base price	15.00c.
Extra tool steel	18.00c.
Special tool steel	23.00c.
High speed steel, 18 per cent tungsten	75c. to 80c.

Tank Plates—Steel

¼ in. and heavier	3.44c.

Sheets

Blue Annealed

	Per Lb.
No. 10	4.34c.
No. 12	4.39c.
No. 14	4.44c.
No. 16	4.54c.

Box Annealed—Black

	Soft Steel C. R., One Pass. Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20	4.30c. to 4.70c.	.....
Nos. 22 and 24	4.35c. to 4.75c.	5.10c.
No. 26	4.40c. to 4.80c.	5.15c.
No. 28	4.50c. to 4.90c.	5.25c.
No. 30	4.75c. to 5.15c.	.....

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	4.60c. to 5.00c.
No. 16	4.75c. to 5.15c.
Nos. 18 and 20	4.90c. to 5.30c.
Nos. 22 and 24	5.05c. to 5.35c.
No. 26	5.20c. to 5.60c.
No. 27	5.35c. to 5.75c.
No 28	5.50c. to 5.90c.
No. 30	6.00c. to 6.40c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel			*Wrought Iron*		
	Black	Galv.		Black	Galv.
⅛ in. Butt	—47	—31	⅛ in. Butt	— 4	+19
¼ in. Butt	—52	—39	¼ in. Butt	—11	+ 9
1-3 in. Butt	—54	—41	1-1½ in. Butt	—14	+ 6
2½-6 in. Lap	—50	—37	2 in. Lap	— 5	+14
7-8 in. Lap	—47	—20	2½-6 in. Lap	— 9	+ 9
9-12 in. Lap	—42	—18	7-12 in. Lap	— 3	+16

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright basic	4.75c. to 5.00c.
Annealed soft	4.75c. to 5.00c.
Galvanized annealed	5.40c. to 5.65c.
Coppered basic	5.40c. to 5.65c.
Tinned soft Bessemer	6.40c. to 6.65c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	21⅜c. to 22⅜c.
High brass wire	21⅞c. to 22⅞c.
Brass rods	18⅜c. to 19⅜c.
Brass tube, brazed	28⅜c. to 29⅜c.
Brass tube, seamless	24⅛c. to 24⅝c.
Copper tube, seamless	27¼c. to 27½c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 24c. to 25c. per lb. base.

Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Bright Tin		Coke—14-20		
			Prime	Wasters
Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	80 lb.	$6.30	$6.05
		90 lb.	6.40	6.15
		100 lb.	6.50	6.25
IC	$11.00	$9.75	IC	6.65	6.40
IX	12.25	11.00	IX	7.65	7.40
IXX	13.50	12.25	IXX	8.65	8.40
IXXX	14.75	13.50	IXXX	9.65	9.40
IXXXX	16.50	14.75	IXXXX	10.65	10.40

Terne Plates

8-lb. coating, 14 x 20

100 lb.	$7.00
IC	7.25
IX	7.50
Fire door stock	9.00

Tin

Straits pig	50c.
Bar	60c. to 65c.

Copper

Lake ingot	19 c.
Electrolytic	18½c.
Casting	18¼c.

Spelter and Sheet Zinc

Western spelter	8½c.
Sheet zinc, No. 9 base, casks	10¾c. open 11¼c.

Lead and Solder*

American pig lead	9c. to 9¾c.
Bar lead	12c. to 14c.
Solder, ½ and ½ guaranteed	33½c.
No. 1 solder	32c.
Refined solder	29c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

Antimony

Asiatic	8½c. to 9½c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	27c. to 28c.

Old Metals

The market continues firm and while business is active there is a tendency in some quarters not to load up too heavily with stock. Dealers' buying prices are as follows:

	Cents Per Lb.
Copper, heavy crucible	14.00
Copper, heavy wire	13.00
Copper, light and bottoms	11.50
Brass, heavy	8.00
Brass, light	6.75
Heavy machine composition	11.00
No. 1 yellow brass turnings	8.00
No. 1 red brass or composition turnings	9.00
Lead, heavy	7.00
Lead, tea	5.25
Zinc	4.50